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ABSTRACT

Acknowledging the changes that poor and homeless students have experienced, this curriculum guide uses change to focus on the challenges found in transitioning into a new environment. The premise underlying the curriculum is that the forces that shape human life are constantly changing, and in order to give meaning to these changes, students must take a careful look at them and understand their implications for the future. Change is therefore broadly considered and is used to allow students to study issues as diverse as growing up, evolution, plant life, time, and historic revolutions. The 25 projects presented have been separated into three sections. Those in section one provide reading and writing projects such as creating a writer's notebook, reading and writing about growing up, reading stories to find cause and effect, and reading and writing about making new friends and about changing moods and emotions. Projects in section two provide science and math activities exploring changing weather, changing seasons, changing colors, electricity, cycles, and time. Projects in section three provide social studies activities exploring immigration to New York, the Middle Ages, how laws are changed, the American Revolution, and changing clothing styles. Thirteen appendices present further information and worksheets to accompany the curriculum projects. (SD)

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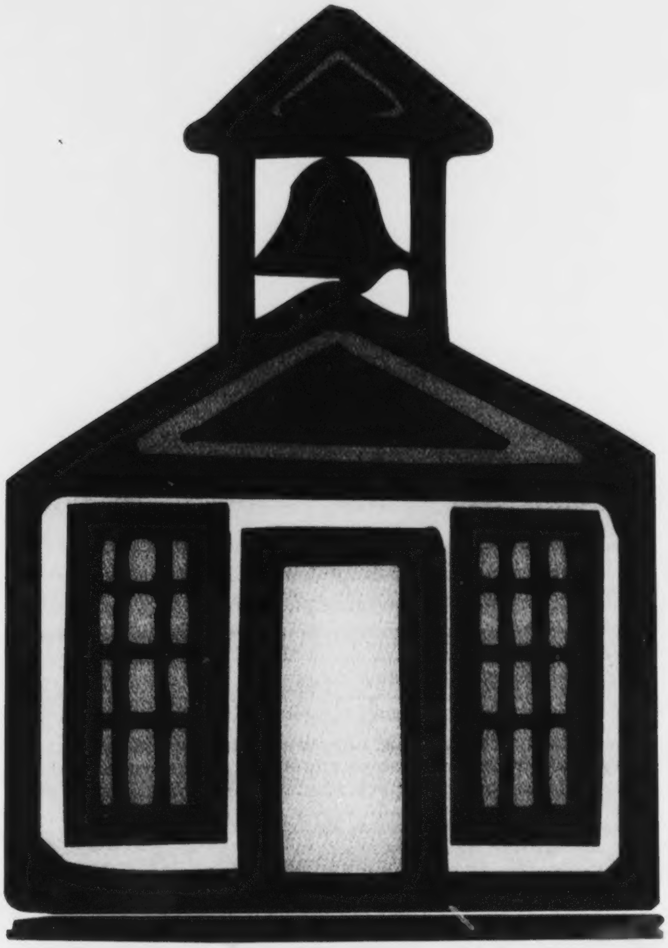

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1999

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Summary and Overview

The curriculum begins with an evaluation of the changes students have experienced over the past few months. For many, this will introduce issues surrounding moving into a new living situation and enable students to evaluate and consider some of the challenges found in transitioning into a new environment. Even students who are resistant to this exercise should be encouraged to evaluate the changes associated with the new school year and new teachers. The central topics associated with change should be an outgrowth of these activities. Students should come to understand that change is a natural condition of the human experience and is difficult for everyone, whether they are young or old.

Students can use the backdrop of starting a new school year and the shift in seasons as a source of enrichment for the curriculum. Change, broadly considered, will allow students to study issues as diverse as growing up, evolution, plant life, time and historic revolutions. The basic premise underlying the curriculum will be that the forces that shape our lives are constantly changing. In order to give meaning to these changes, students must take a careful look at them and understand their implications for the future.

After the initial, reflective exercise regarding change is completed, students will begin to study the idea of change in a wide variety of forms. Each of the remaining projects within this curriculum is specifically designed to combine various subject matters and areas of study that students encounter in school with the idea of change. These various projects have been separated into sections—Reading and Writing, Science and Math, Social Studies—and each stress higher-order literacy skills. These lessons can be done in any order, although it is best to begin with "New Beginnings: Creating a Writer's Notebook" and end with "A Play about Change."

The grade level of the curriculum centers on students in the later elementary grades (third to fifth grade). However, each project in the curriculum contains instructions on how to increase or decrease the length and difficulty of the lesson. Since students of all ages and abilities will be working on each project, these guidelines help customize lessons to meet students' needs.

On average, the twenty-five different projects in this curriculum require three sessions to complete. A few lessons (including the first one, "New Beginnings: Creating a Writer's Notebook") will span the entire curriculum, which will last approximately six months. The theme of change is ideally suited for the various events of the fall and winter seasons. However, lessons can be repeated in the spring and summer.

In each of the lessons, students will be encouraged to work in groups of two or three to complete various projects. For the most part, these groups will be homogeneous by age or skill level. In certain instances, heterogeneous groupings may be appropriate, especially in instances where non-readers will need to accomplish projects that require basic literacy skills. Teachers should make these grouping decisions on an individual basis. As projects last anywhere from one to six sessions, groupings should change so that students gain experience working with a wide variety of individuals and group sizes.

A few of the projects listed, such as field trips, will require the participation of all students. In addition, depending on the number of students in attendance or the constraint of resources, it may be necessary to complete certain projects as a large group. In these cases, students should be given some opportunity to demonstrate their connection with the project on an individual basis or in smaller groups.

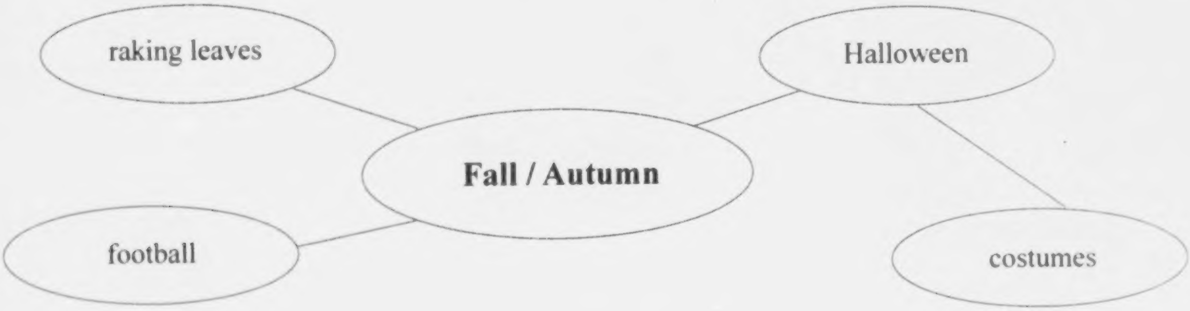
Some projects will build on ideas and skills acquired in other projects. In such cases, the introductory description will note which projects should precede it. In the curriculum, projects are ordered so that stand-alone projects come before those that require skills or materials of other activities.

The conclusion of the curriculum should be brought together with a culminating activity in which students share some of the work they have created over the previous few months. Each project concludes with a suggestion for an extension activity that would be suitable for an end-of-curriculum presentation. Students will compile whatever work they produce for this presentation in a portfolio. The portfolio should also include any other project work they feel best represents their efforts throughout the course of the curriculum. This end-of-curriculum presentation may be linked with a field trip or speaker, or it may be a stand-alone activity such as a talent show or project fair. The main objective is to give students an opportunity to take pride and ownership in their tasks. The more these final activities are shared with a larger community, such as parents, the more meaningful they become for both students and staff.

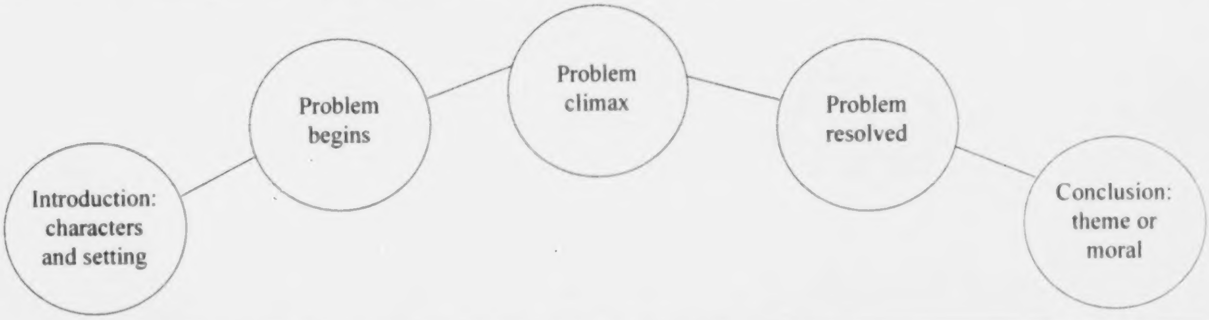
Explanation of Common Terms

Throughout the course of the curriculum, there are frequent references made to several different types of graphic organizers. Graphic organizers are teaching devices that allow students to list and categorize information around a certain topic. Each organizer uses a specific graphic device, such as a pie chart, to help students sort through a great deal of information in order to find the pieces that are relevant. For example, students will often be asked to brainstorm ideas related to a certain topic. A graphic organizer can help chart student responses by dividing certain responses and ideas into separate sub-categories. The following list gives a general overview of the most commonly used graphic organizers featured in this curriculum.

Idea Web:
The *Idea Web* is a device designed to encourage student brainstorming on a topic. The web is generally used at the beginning of a lesson to help students recognize the amount of prior knowledge they bring to a topic. Begin by drawing a circle around the word being studied in the middle of a piece of chart paper and ask students what they think of when they see this word. Most responses that have at least something to do with the topic should be charted. Try and organize students' ideas into categories at the beginning or draw a more developed chart after the initial brainstorming session. The *Idea Web* might look something like this:



Story Map:
The *Story Map* is a graphic representation of the main elements of a story or narrative. Using circles and lines, the story map charts the beginning, middle and end of a story, as well as any introductory and concluding elements. This chart helps students read for meaning by visually representing the main events of a story. Students may also use the chart to keep track of details while they read such as character descriptions and the setting of each successive scene or section. The *Story Map* might look something like this:


Problem climax
Problem begins
Problem resolved
Introduction: characters and setting
Conclusion: theme or moral

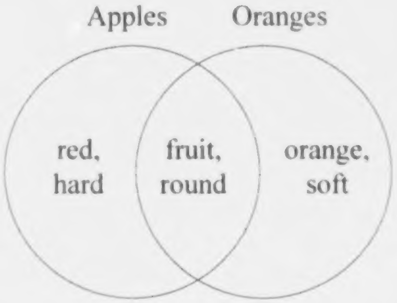
K-W-L Chart:

A *K-W-L Chart* is specifically designed to help students set clear objectives for learning when conducting a complex or detailed research project. Students list their prior knowledge about a given topic at the beginning of the project. Once this knowledge is compiled and organized, students can then list any additional information they would like to find out but do not already know. Finally, students will conclude the research project by listing any new information they discover. Student research should focus on the questions they outline at the start of the project. Charting what students already Know about the topic, what they Want to know and what they Learn in a *K-W-L Chart* might look something like this:

Topic	**What We Know (K)**	**What We Want (W) to Learn**	**What We Learned (L)**
Butterflies			
Caterpillars			
Chameleons			

Venn Diagram:

A *Venn Diagram* is a graphic device that is used to determine the intersection of two sets of numbers. It can also be very helpful in comparing and contrasting two distinct ideas, objects or characters. The shared part of the two circles is reserved for common features of the two things being compared. Those features that are exclusive to one item are placed in the area of that circle that does not overlap with the other circle. A *Venn Diagram* might look something like this:



Cause and Effect Chart or *Cartoon:*

Both the *Cause and Effect Chart* and *Cartoon* are designed to help students trace the main causal relationships in a story, experiment or mathematical equation. Let younger students use pictures to demonstrate the relationship between two events, and have older students express themselves with pictures as well as words and break down complex chains of events. With respect to this curriculum, students can use these charts and cartoons to help them visualize the consequences of a certain change in the topic they are studying. In other instances, students may wish to work backwards, first documenting or charting the effect of a given change and then looking for its cause. A *Cause and Effect Chart* or *Cartoon* might look something like this:

Cause	**Effect**
[Student drawing or tracing] The mosquito told a ridiculous lie…	[Student drawing or tracing] The Iguana put sticks in his ears in order not to hear such foolishness.

T-Chart:
A *T-chart* lets students create lists about a certain topic or idea that separates information into two different categories. The items are sometimes numbered, but in the case of advantages and disadvantages pairing is not necessary. These categories can include a term and its definition, a character and his or her description, or the advantages and disadvantages of a policy. T-charts allow students to have clear distinctions between two sets of information with pre-defined spaces for both. A *T-chart* might look something like this :

Changing Moods

Emotions	How it makes you feel
1. Happiness	1. Glad and care-free
2. Loneliness	2. Sad and scared
3. Crazy	3. Wild and out-of-control, zany

Then and Now Chart:
A variant of the t-chart is the *Then and Now Chart*, which helps students compare different aspects of life during two different periods of time. A *Then and Now Chart* might look something like this:

Transportation

Then - 1899	Now - 1999
1. Horse-drawn carriages	1. Cars
2. Steam-powered locomotives	2. Planes
3. Steam-powered Ocean Liners	3. Roller Blades

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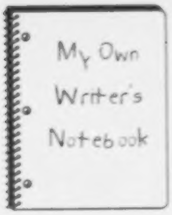


NEW BEGINNINGS:
Creating a Writer's Notebook

Project Overview:

This project will consider the academic and social side of growing up by examining the challenges students face—adapting to changing circumstances and surroundings—when a new phase in their life begins—entering a new class, grade, school or neighborhood. Throughout the project, the themes of responsibility and maturity will be stressed as an integral part of growing up and as necessities in dealing with change. The selected texts that students will encounter during this project will feature a young person who is facing a major change in his or her life.

Using these various pieces of literature as a springboard, students will begin a writer's notebook that will be specifically designed, at least initially, as a place to record all of the events associated with changes in each student's life. Students should use the notebooks as more than a place to keep track of the different things that are changing around them. They should be pushed to consider what challenges are inherent in growing up. As the notebook progresses—it should be kept throughout the entire curriculum and hopefully beyond—it should help students consider how they can learn from these new experiences.

Note: Many of the ideas and themes raised in "New Beginnings: Creating a Writer's Notebook" will be covered again in "Growing Up: Important Lessons in Life." While it can stand on its own at any time during the theme, it is recommended that "Growing Up" be used immediately following the completion of this project.

Student Goals

- Students will recognize themes of change occurring in their own lives in the literature they read for this project.
- Students will build a writer's notebook that will record their thoughts and emotions surrounding the changes occurring in their lives.
- Students will come to understand the importance of pushing themselves and taking responsibility for their own learning.

Student Motivation/Mini-Lesson:

During the mini-lesson, students will be exposed to literature that deals with changing circumstances and the personal responses people have to those changes. Explain that a writer's notebook will be their place to collect and keep the various bits of life they observe all around them—the metaphorical "soil" of their writing. From this collection of thoughts, dreams, lists, wonderings, observations and conversations, students will find the "seeds" of important pieces of writing that will help them understand and deal with the changes going on in their lives.

Using Dr. Seuss' *Oh the Places You'll Go* as a starting point, introduce students to the idea of a personal narrative that keeps track of changing circumstances in someone's life. Stress the attention Dr. Seuss pays to new experiences, new people and new places. Next, if possible, use one of the books from the *Amelia's Notebook* series. Each of these books contains a fictional notebook kept by a young girl who takes on both ordinary and extraordinary adventures. The books do a good job of demonstrating the wide variety of material that is suitable for a writer's notebook.

Materials Needed

- *Oh the Places You'll Go* by Dr. Seuss
- One spiral, wide-ruled notebook for each student
- Selections from *House on Mango Street* by Sandra Cisneros (primarily for older students)
- *Amelia's Notebook*, *Amelia Writes Again* or any book in the *Amelia's Notebook* series by Marissa Moss (optional)

Project Activities

1. INTRODUCE THE IDEA OF THE WRITER'S NOTEBOOK

The writer's notebook will be the place where anything new, exciting, unexplained or unexpected is kept, where all of the sights, sounds, people and places that students encounter in their new setting are tracked. Make writer's notebook entries part of students' daily routine. Initially emphasize getting their ideas on paper without concern for structure, spelling and grammar. While these technical writing skills will be a continual focus throughout the year, free expression of ideas should be recognized as the essential starting point to improved writing. **For a first entry, ask students to consider questions such as: How is the classroom different? Who are the new people you have met? Are there new teachers in the school?**

Note: Have students recognize that this is not a journal where they simply recount the main events in their lives. For students who wish to turn the writer's notebook into more of a diary, suggest that they create two separate notebooks: one of a more personal nature; the other with entries that students can sometimes share with the class.

2. GIVE STUDENTS EXAMPLES OF NOTEBOOK ENTRIES

Provide a model of the beginning of a writer's notebook by completing a few entries about your own life. For example, compose a list entitled **"Ten Things I Never Noticed Before"** as an example of a notebook entry. Stress that your notebook entry was not about simply stating a personal experience in story form. The writer's notebook is a place to keep observations, lists and ideas. From these lists and observations, students will eventually find something that they wish to write about in greater detail. This initial process is simply generating the seeds from which those stories will grow.

3. HELP STUDENTS COME UP WITH NOTEBOOK ENTRY IDEAS

In order to get them started, **ask students to visualize a familiar walk they take each day.** Students should try to remember as many details as they can, examining every building, person and street they pass, every sound they hear, every smell they come across. **Link this detailed look at their walk to the idea that their writer's notebook is the central place to keep track of all the observations they have in everyday life.**

4. HAVE STUDENTS SHARE THEIR NOTEBOOK ENTRIES

Have students share the various observations from their walk that they included in their writer's notebook entry. Stress the idea that the different details of a student's walk home are in themselves very interesting things. Make sure students realize that it is only after we see all that is around us that we can truly appreciate how special and unique our lives really are.

Project Wrap-Up & Enrichment

The writer's notebook should be a daily part of students' activities throughout the curriculum. Students should be encouraged to use the notebooks as a place for their thoughts, feelings, observations and experiences. A writer's notebook entry could be used to enhance and reinforce later lessons. On other occasions, simply give students topics to write about, like those used in this lesson, or allow time for students to write creatively. As the curriculum progresses, students might expand the scope of their writing. Instead of focusing on those events that reinforce the theme of change, students may want to begin keeping a writer's notebook which deals with all aspects of life. Students should carry their writer's notebook with them at school and at home in order to begin living a "wide awake life." This is defined as a life of seeing, hearing, noticing and wondering about the world, and collecting these various thoughts in a special place—their writer's notebook.

Have a notebook museum where each student puts his or her notebook on display to be looked over by other students. Students may want to compile a number of their entries and present their work as part of an end-of-curriculum presentation. Students should work to compose at least two polished notebook entries that will be entered into their portfolio.

Tips for Increasing the Difficulty of the Project:

Suggest that students turn their writing into monologues or memoirs worthy of presenting or publishing. Encourage students to select entries that deal with the themes (change, maturing) brought up by many of the stories the group reads for the lesson. Examples from *House on Mango Street* might prove helpful to students in understanding point-of-view and descriptive story-telling. Have students who want to perform a monologue choose one or two of their notebook entries for presentation. These monologues could be made into dialogues or dramatic scenes, and serve as the basis for student exploration in later units.

Tips for Decreasing the Difficulty of the Project:

Let those students who are not yet reading or writing proficiently draw their impressions of new people, places and events in their writers' notebook. Team up with these students, or team them up with another student, to discuss and transcribe their observations, ideas and drawings.

GROWING UP:

Important Lessons in Life

Project Overview:

This project will use literature to help students with ideas surrounding the process of growing up and maturing. Students will read various stories to uncover the basic themes of growing up, and compare and contrast the different ways authors write about these subjects. In all cases, students will be asked to identify the changes that are occurring in the life of the main character or characters as a way to identify the lessons about growing up being taught in the book. Read the first story to and with the group to demonstrate how good readers can "read between the lines" and discover the underlying messages and lessons that authors want to give to their audience. Students will then read books on their own or in smaller groups to discover these sometimes hidden messages.

Student Goals

- Students will learn how to set a purpose for reading—such as identifying the changes in the life of the main character or characters—to help frame their thinking before they read.
- Students will learn to apply basic comprehension skills while reading and will gain literacy skills by reading on their own or in small groups.
- Students will write responses to open-ended questions about the books they read and will model entries in their writer's notebooks after ideas and techniques they encounter in books.
- Students will use higher-order thinking skills to reflect on what they read and interpret the ideas in books to uncover various themes and morals.

Student Motivation/Mini-Lesson:

Introduce the lesson by asking students to think about the following question: Why do writers write stories? Try to elicit as many ideas as students can think of, being careful to accept all answers as valid. Students should reflect on "New Beginnings" and what they hope to get out of keeping a writer's notebook. From the list the students create, select responses that have something to do with teaching lessons about life. Tell students that one of the biggest reasons authors write books and stories is to teach about life from another person's perspective. With that in mind, students will read a number of stories where the author has something he or she wants to teach young people about growing up. Add that good readers are able to read stories in search of these "hidden" messages that the author creates.

In order to uncover these "hidden" lessons, students will need to develop a strategy or purpose for their reading. Suggest that most lessons we learn in life occur when we have to deal with an important change in our lives. To this end, students will need to pay special attention to the changes that are occurring in the lives of the main characters. As they identify the changes that are going on, students can gain clues into what the author wants to tell the reader about handling this change. For each poem or story, students should create a list of changes in the life of the main character. From this list, they will be able to discover the "hidden" meaning of the story.

Materials Needed

- *Sadako and the 1,000 Paper Cranes* (children's novel) or *Sadako* (picture book), both by Eleanor Coerr
- Origami paper and instructions for making paper cranes (available on the Internet)
- Suggested Titles: *You're the Boss Baby Duck* by Amy Hest; *Fables* by Arnold Lobel; *Your Move* by Eve Bunting; *Time of the Lion* by Caroline Pitcher; *The Book of Virtues for Young People* edited by William Bennett; *The Berenstain Bears* Books by Stan and Jan Berenstain

Note: The selection of books is based on the changes characters experience and the lessons they learn from that process.

Project Activities

1. START WITH AN EASIER BOOK

Choose an easier book about growing up and dealing with change. Introduce the book and **let students make predictions** about what the main issues will be. Next, **have students chart the major changes** occurring in the main character's life. Have students identify the "hidden" messages of the book by studying the changes the main character faced and how he or she dealt with them. **Have students write up the lessons and moral of the story in some creative format.**

Note: You're the Boss Baby Duck is one possible book for this activity. The book is about Baby Duck who is upset by the addition of a new baby into his family. His grandfather teaches him that along with growing up comes more important responsibilities. Baby Duck finally welcomes his new baby sister by taking care of her.

When charting, students may want to use a graphic organizer such as an idea web or a before and after cartoon (see the introduction's "Explanation of Common Terms" for descriptions). See Appendix J, Enrichment Ideas for Reading Books, for project suggestions.

2. REINFORCE THE FIRST BOOK WITH A HARDER BOOK

Introduce the *Sadako* story. Preface the book with a short discussion of World War II and the bombing of Japan. Like with the previous story, **have students chart the changes** that begin to occur to Sadako as she gets sick. As these changes continue to occur, Sadako learns things about her family, friends and the other children she meets in the hospital. **Be sure to point out these changes as they occur in the book.** When the story is completed, have students study the changes that Sadako experiences over the course of the book in an effort to discover as many "hidden" meanings in the text as possible. The most central lesson from Sadako's illness and death is the evil of war and how innocent people are hurt by it.

Note: Sadako is about a young Japanese girl who is poisoned by the atomic bomb dropped on Hiroshima, Japan. She becomes sick and her friends and family fold paper cranes to help her get better. After her death, Sadako and the paper crane come to symbolize peace around the world. While this is a fairly intense book for very young students, it does a great job of demonstrating the power a novel can have in helping people understand basic values of life. For older readers, the longer version of the story (roughly 70 pages) can be covered over the course of three or four days. The picture book can be covered in one session.

3. LET STUDENTS CHOSE A THIRD BOOK INDEPENDENTLY

Have students select a text on their own from the library that they believe will teach an important lesson about life and growing up. Students will need to read the summaries of the stories on the inside cover or the back of the book to see if they fit with this project. Students may also want to look at the illustrations in the book or skim a few pages. Once students have selected a book, they should begin to read with an eye towards the changes experienced by the main character(s). **Have students list these changes in a reading log or notebook.** Instruct students to look at the changes and experiences of the main character(s) and **put together an explanation of what the story hoped to teach the reader about growing up.** They should attempt to support this opinion with facts from the book.

Note: A possible explanation…The fact that Sadako, a young girl, was killed by a bomb teaches us that war is very painful and hurts truly innocent people. In addition, the fact that students all over the world fold paper cranes and send them to the Sadako Peace Park in Japan teaches us that children hate war and want it to stop.

Project Wrap-Up & Enrichment

Students may want to formalize their three "hidden" meaning charts with drawings and personal opinions about the events in the story. In addition, have students write a story about an important lesson they learned while growing up. Students may want to use entries from their writer's notebook. They should also be free to write a fictional story if they wish that teaches an important lesson in a creative way (i.e. using animals to tell the story as in the case of the *You're the Boss Baby Duck*). In either case, stress that the "hidden" lesson in their story should not be said in so many words. Ideally, students should give their message or lesson through the action in the story, as was the case in most of the books they read (with the notable exception fables which list their moral at the end).

Students who are very interested in this project may want to write a picture book or detailed story that teaches a lesson for their end-of-curriculum presentation. After several drafts, they should have an interesting story that engages the reader while, at the same time, teaches the reader an important lesson about growing up.

If students enjoy the *Sadako* story a great deal, they may want to learn how to fold paper cranes. There are a number of good origami books that include details on folding cranes, as well as a web site dedicated to Sadako, paper cranes and the related peace project.

Tips for Increasing the Difficulty of the Project:

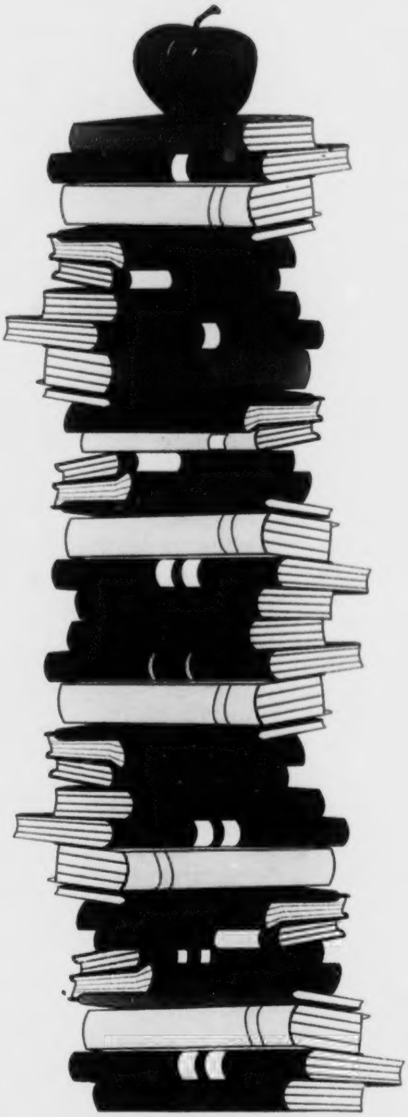
For older students, skip the easier story and go directly into the longer, book version of *Sadako*. Also, instead of using "'hidden' meaning" when describing the central ideas featured in the books, introduce the literary concepts of themes and morals. Teach students the definitions of these terms and have them write about, or otherwise document, the development of themes and morals in each story. Possibly add other elements of fiction into this process.

Note: In the longer, book version of *Sadako*, there is good character development that really demonstrates Sadako's growing fears. Keep in mind that the book is commonly read in fourth and fifth grade classrooms, contains some challenging vocabulary, and might take as long as a week to finish.

Tips for Decreasing the Difficulty of the Project:

Students may need to have both the easier book and the *Sadako* picture book read to them. In this case, lead the three-part process of charting each book—predicting, listening for changes and describing the "hidden" meaning or lesson—and work through the process together. In addition, students may need to have a third book identified for them. This book could also be read as a group. *The Berenstain Bears* series is the easiest to read of the suggested titles.

READING and WRITING



CHANGING YOUR MIND:

Green Eggs and Ham

Project Overview:

Students will read the Dr. Seuss classic, *Green Eggs and Ham*, in order to take a look at the process of trying to convince another person to change his or her mind about something. Students will learn a number of different techniques and strategies which are all designed to aid in the process of persuasion. At the conclusion of the project, students will create their own narrative which will outline the process of convincing someone to reconsider his or her original intention.

Student Goals

- Students will take a funny but important look at the technique of changing someone's mind.
- Students will note various persuasive techniques that can be used to change another person's mind and list the pros and cons of each approach.
- Students will create their own story that includes different persuasive techniques.

Student Motivation/Mini-Lesson:

Ask students to think about occasions when they wanted to convince another person to do something that the other person did not want to do, or when they did not want to do something another person wanted them to do. Students should write these examples in their writer's notebook for later use in the project.

Ask students to think of all of the different ways they use to convince someone to do or try something. Pick one student's example as a the basis for the discussion or open it to all sorts of different scenarios. In either case, the group should come up with a list of techniques that people use to try and convince others, entitled "mind changers." The discussion should also focus on which techniques work better than others and why.

The class should now compile a list of objections that people use to get out of something they do not want to do, entitled "mind keepers." Again, these various objections should be listed by how effective they are and why. In both instances, take specific examples and turn them into general types of persuasive techniques and objections. For example, if a student suggests that she offered her brother a lollipop to take out the garbage for her, put this under the category of "offering a reward or bribe."

Materials Needed

- *Green Eggs and Ham* by Dr. Seuss

- Pre-made booklet with 10-20 pages

  Note: This could be done simply with staples and paper or see Appendix A for a reference list of books giving detailed instructions on book-making techniques.

- *Make Your Own Book Kit* by Running Press (optional)

  Note: Make Your Own Book Kit is available at Barnes and Noble Booksellers or any large bookstore.

Project Activities

I. READ AND DISCUSS *GREEN EGGS AND HAM*

Introduce *Green Eggs and Ham.* Show students the cover and illustrations in the book and ask them to make predictions about the story. **Instruct each student to look for instances in the book where one person tries to convince another to do something he does not want to do.** Students should pay attention to the different techniques used to try and convince someone to do something. Similarly, they should consider the different types of objections that are used in the book to get out of doing or trying something. Either read the book in a large group, or, if possible, divide the students into smaller groups and have them read it on their own.

2. REVIEW AND DISCUSS *GREEN EGGS AND HAM*

After the book is read, **have students identify the characters and summarize the premise of the book** (namely that Sam I Am attempted to talk his friend into eating green eggs and ham). **Instruct students to go back into the book and locate examples of both "mind changers" and "mind keepers" from the lists compiled in the pre-reading mini-lesson.** Students should then decide, based on their reading of the book, whether they would have eaten the green eggs and ham. Be sure students write responses to each of the different persuasions, or "mind changers," that were included in the text.

3. HAVE STUDENTS CREATE THEIR OWN BOOK

Give students pre-made booklets (see Appendix A) or instruct students to each make a booklet. **Have students decide on and write a story that involves trying to convince a person to do something he or she does not want to do.** Remind students of the examples they came up with during the introductory mini-lesson. Make sure that students use more than one "mind changer" and "mind keeper" technique in their story.

Project Wrap-Up & Enrichment

For students who really enjoy writing their own book, encourage them to include it as part of their end-of-curriculum project. Encourage students who decide on this activity to make a better quality book (see Appendix A). In addition, encourage those students to try and incorporate the writing style and illustrations featured in *Green Eggs and Ham*, including rhyming, nonsense words and humor. In all cases, the idea of trying to change someone's mind should be paramount in the book.

Tips for Increasing the Difficulty of the Project:

Have students read the book on their own, reminding them that the purpose of reading *Green Eggs and Ham* is to list and categorize the various techniques that characters use to convince someone to change his or her mind. Also, have all students create a story that is similar in style to *Green Eggs and Ham* (see the Project Wrap-Up & Enrichment above for more detailed description).

Tips for Decreasing the Difficulty of the Project:

Present the group with a list of techniques that people use to change someone else's mind. While reading *Green Eggs and Ham*, stop at various points in the book to ask students which of the pre-determined techniques characters are using. Label each of the sections of the books students write as follows: I ask someone to do something; They refuse; I try to convince them to do it; Final decision.

IF I COULD CHANGE THE WORLD

Project Overview:
This project will allow students to read a pair of fanciful stories about life in New York City. From these stories students will create their own personal "flights of fancy," where they will imagine themselves being able to change the world around them. Students will learn a new genre, poetic imagination, and will imitate the basic patterns in their own writing.

Student Goals

- Students will read for meaning in two stories that document what a young person might change about the world if they had the power.
- Students will be able to compare and contrast the various aspects of each story.
- Students will read for the cultural influences of each author and how his or her background changes the perspective of the story.
- Students will observe the unique aspects of each story, including the author's writing style, and imitate the content and style in their own works of fiction.

Student Motivation/Mini-Lesson:

Ask students about dreams like: How often do you dream? Do you always remember your dreams? Are they scary? Funny? What is your most memorable dream? Once students have answered these questions and shared most of their thoughts on dreams, ask students to consider the difference between dreams and daydreams. If students do not know the difference, tell them that daydreams are the things we imagine when we are awake. Give some examples to help clarify the distinction. As soon as students have a general idea about daydreams, ask them to consider how daydreams are different from regular dreams.

From these initial discussions, students should have a general sense that many dreams are about wish fulfillment, especially daydreams, which are easier to control. Tell students that the two books they are about to read tell the story of the authors' lives as young people in New York City. In both cases, the authors decide to leave reality for a little while and take a "dreamy" trip around New York City. Ask students to look at the pictures and see if they see any similarities in the books (they should notice that the characters appear to be flying in both books). From this observation, introduce the term "flight of fancy" to describe the central ideas of the books.

Materials Needed

- *Tar Beach* by Faith Ringgold
- *Abuela* by Arthur Dorros
- Optional or Suggested Titles: *Goodnight Opus* by Berkeley Breathed; *James & the Giant Peach* (picture book) adapted from the story by Roald Dahl

Project Activities

1. PREPARE THE CLASS FOR THE PROJECT

Before reading either book, inform students that they will be making their own fanciful story after reading the two books. With this in mind, **encourage students to pay close attention to every detail of the book**—from the pictures, to the language used, to the places visited in the story.

2. READ *TAR BEACH* BY FAITH RINGGOLD

Ask students to think about the title. Has anyone ever heard of the term? Explain the term if no one knows that it is the roof of a building. Then ask students if they have ever been on a roof and if they know what it is like. **Read the story, being careful to show students the illustrations.** Once the main character starts to fly, stop and remind the students that this part is the author's imagination at work. Tell them to take notice of the things she changes once she has the power to fly. **Have students write or say their general impressions of the book.** Ask them to consider if the book is about modern day New York City. How does the book describe New York City? What do they like? Dislike? How would they describe the author?

3. READ *ABUELA* BY ARTHUR DORROS

Ask students about the word "abuela." Make sure they know it is Spanish and that it means grandmother. Once students understand the term, prompt students for their feelings about grandparents. Close the pre-reading discussion with a quick mention of the setting of this story, which is a park in New York City. Ask what things students like to do in parks. **Read the story following the exact pattern of discussion questions for *Tar Beach*.** When the main characters begin to fly, ask students to notice where the characters go and what they want to change. As with *Tar Beach*, **have students write or say their general impressions of the book.**

4. COMPARE AND CONTRAST THE TWO STORIES

Have students draw a Venn diagram comparing and contrasting the two books (see the Introduction's Explanation of Common Terms for a description of Venn diagrams). One circle should represent *Tar Beach* and the other *Abuela*. Instruct students to put things the stories have in common in the center area. Those things true only of *Tar Beach* go in the part of the *Tar Beach* circle that does not intersect the *Abuela* circle and vice-versa. Go over the Venn diagrams with the students. Check to make sure that they have mentioned the shared qualities of flight, imagination, setting and changing the world, and that they noted differences between the cultural backgrounds of the two authors. **Ask students to write up a short comparison of the two stories using their Venn diagram as a guide.**

Note: The structure for a good write-up should have an introduction, a description of both stories, a paragraph of things the stories have in common and one or two paragraphs of what makes them different. The write-up should end with a paragraph about which story students liked better and why.

Project Wrap-Up & Enrichment

Students are now ready to write up their own "flight of fancy" story. Before students begin, remind them that much of what makes both of these stories so powerful is the way the main characters talk about the changes they would make in the world around them if only they had the power. This desire to change the world should be one of the central features of each student's story. Encourage students to include elements that appear in both *Tar Beach* and *Abuela*, and use their Venn diagrams as a guide. Let students know that while they can use the stories as a guide, they need to make their story personal. Students need to tell a story of how they would change the world, not how someone else would.

For students who are stuck, help them get started by re-reading both books and then asking some leading questions. These questions could include: How do the authors start their stories? Are they in places where they have happy memories? These questions may be helpful in getting students to pick a favorite spot and travel companion in order to begin.

Students who are especially fond of these books or their own personal story may want to make this project the basis for their end-of-curriculum presentation. Students should be encouraged to make a detailed picture book (see Appendix A for book making tips) that tells the story of their own journey to change the world.

Tips for Increasing the Difficulty of the Project:

Students might want to write a follow-up to their story. In the follow-up, students could imagine that the changes they made did not exactly turn out the way they wanted. Examples of wishes gone bad in literature include: *Frog Prince, Continued* by Jon Scieszka; and *The Sweetest Fig* by Chris Van Allsburg. In both instances, the phrase "be careful what you wish for, someday you may get it" is applicable. This exercise would be a great critical-thinking tool to get students to think about the consequences of certain actions.

Tips for Decreasing the Difficulty of the Project:

Students may simply want to read both stories and then tell their own fanciful day dream. In this way, students would not need to stick to the rigid constructs outlined in the above activities. Without having to use the Venn diagram or imitate many of the particular uses of language and plot construction that run through both of these stories, students could simply retell a favorite dream or fantasy they hold dear.

BEFORE AND AFTER:

Reading Stories to find Cause and Effect

Project Overview:

Students will be introduced to the idea of "cause and effect" through a number of texts and real-life observations. Students will begin with a riddle that requires them to look at an outcome, or effect, and then work backwards to find the cause. *Where the Wild Things Are* and *The Giving Tree* provide excellent examples of how "cause and effect" works in literature that students can organize and chart using graphic organizers. Students will map other stories in the same way, being careful to note the conditions at the beginning and end of a story, and the various causes that produce the changes or outcome.

Note: In addition, there are related science activities to this project in Appendix B—Riddles Worksheets; Making Inferences Exercise. If students enjoy the riddles, it might be fun to conduct the experiments where students observe various effects and must try to establish their causes.

Student Goals

- Students will learn the basic concept of "cause and effect" and how it is used in telling stories.
- Students will use clues to solve a riddle. This process of fact-finding will be directly related to finding "cause and effect" in literature.
- Students will see how authors use causes to build suspense and tell us things about why people act the way they do and what the consequences are of certain actions.
- Students will learn how to utilize graphic organizers to chart the events in a story. These organizers will give students a tool to help understand why certain things occur in a story.

Student Motivation/Mini-Lesson:

Begin with a brief overview of "cause and effect." Hand out a copy of Riddle I (the long or short version) to each student. Read through the riddle. Take students through a series of steps to solve the riddle as a group and teach the concept of "cause and effect." Re-introduce the terms "cause" and "effect" and how they apply to this riddle. Have students fill in the "effect" frame of their Cause and Effect Chart or Cartoon and include as many details as they can. Draw a large version of the chart and take student suggestions for what to include. Ask students for pertinent information such as: Was anyone else in the room? What else was on the floor? What did the police officer see? How do George and Martha look? Continue to provide hints until the riddle is solved. Then have students complete the "cause" portion of the cause and effect chart. In addition, tell students to go back and change the "effect" section of their chart if they drew people for Martha and George.

Summarize this activity by stressing that finding causes and effects is the best way to try and find the answers to things we do not understand. Scientists are constantly looking at the effects of things (like earthquakes and stars) and trying to figure out their causes. Similarly, good readers can understand books they do not originally understand by finding the causes and effects that occur in the book.

Note: A more detailed explanation of Cause and Effect Charts and Cartoons is included in the Explanation of Common Terms section in the Introduction. Both a simple and complicated version of the riddle are in Appendix B. The solution to the riddle: George and Martha are goldfish and they were killed when the cat jumped at the fishbowl and knocked it over; the pebbles and glass are from the fishbowl; the police officer figures out what happened when he sees the litter box.

Materials Needed

- Riddle worksheets – Appendix B
- *Where the Wild Things Are* by Maurice Sendak
- *The Giving Tree* by Shel Silverstein
- Optional Readings: *Wings* by Jane Yolen; *Why Mosquitoes Buzz in People's Ears: A West African Tale* by Verna Aardema; *The World That Jack Built* by Ruth Brown; *A Usual Day at Unusual School* (See Appendix C for information on related activities for these books)

Project Activities

1. READ AND ANALYZE *WHERE THE WILD THINGS ARE*

Have students read *Where the Wild Things Are* in small groups. Post a series of questions to help students sort out the events of the story or have students write a summary of the story's main events. In either case, students should read with the purpose of noting the changes in the story and what caused these changes. Students should review the different changes that occur to Max's room during the course of the book. How does it look when he is sent to his room? What happens next? How does it look at the end of the book?

2. CHART AND MAP CAUSES AND EFFECTS

The students should now attempt to chart all of the different events of the book. For example, the first scene in the book has Max making mischief. Students can enter this in the "cause" box of their Cause and Effect Charts or Cartoons. Have students continue "cause and effect" mapping for the rest of the book. Preface this activity by informing students to act as the story detective who must discover why each event took place. Often the author will try and hide the cause of why something happens because he or she wants the reader to have to stop and think about why things happen the way they do. This way readers will dig deeper into the book to understand exactly what happened. **Have students complete at least three Cause and Effect Charts or Cartoons on *Where the Wild Things Are*.** Provide students with the final chart to help frame their thinking. The effect box should state something like: "Max finds his supper waiting for him—and it is still hot." Students must now try and figure out what caused all of this to happen.

3. READ AND ANALYZE *THE GIVING TREE*

Have students read *The Giving Tree* by Shel Silverstein. Follow the same steps used for *Where the Wild Things Are* with this more complex piece of fiction. Students should begin the process by considering what changes the tree undergoes throughout the course of the book. Have students record these changes as they read. Again, it may be helpful to supply the first cause to help the students in the process of mapping the entire story. In this case the first cause could be the boy playing on *The Giving Tree*. The effect would be that the tree was happy. Have students chart the "cause and effect" of each change the tree undergoes throughout the story.

Project Wrap-Up & Enrichment

Students could decide to map a third book of their choosing using Cause and Effect Charts or Cartoons. As before, the depth and complexity of the book should be increased in order to have students demonstrate mastery over the idea of "cause and effect." Students may also decide to complete the project by mapping their day using a series of Cause and Effect Charts or Cartoons. In this case students might begin their story with a chart that labels the first cause as "I had to go to school" and the effect being "My mom woke me up at seven o'clock in the morning." A third way to demonstrate the "cause and effect" relationship would be to have students attempt to solve the second riddle in Appendix B using Cause and Effect Charts or Cartoons. In this case, show the students how these charts could be expanded to include choices and their possible outcomes.

Students could take any of these enrichment activities and use them for the basis of their end-of-curriculum presentation. For example: students could create "cause and effect" maps for a new story they read; students could map out, using real items and pictures, the causes and effects of a day in their life; or students could write other "cause and effect" stories or invent riddles for others to solve.

Note: The answer to the second riddle is to ask the following question: "Which way is your home?" In this scenario, both the truth telling tribe and the lying tribe will point the same way towards the truth telling tribe. The cause and effect boxes could be drawn in a way that the effect would be determined by whether the question were asked to someone who is lying or telling the truth.

Tips for Increasing the Difficulty of the Project:

Students may want to skip *Where the Wild Things Are* and read only *The Giving Tree*. Next, pick a more advanced story such as *Wings: The Myth of Dedalus and Icarus* by Jane Yolen, and have students chart the various causes and effects in the story. Another alternative is to not supply students with any of the opening or closing causes and effects in the two stories, making them complete the charts without hints. All students could be required to solve the second riddle (Appendix B) in the manner prescribed in the enrichment section of this project.

Tips for Decreasing the Difficulty of the Project:

Students may use the simpler version of the first riddle or may skip *The Giving Tree* since the final ideas of "cause and effect" get somewhat complex. Simpler story options could be fairy tales like *Cinderella* or fables such as *The Tortoise and the Hare*. Give students Cause and Effect Charts or Cartoons with one half filled in—either all the various causes of events in the book or all the effects, and require that students simply match causes with effects or vice-versa.

MAKING NEW FRIENDS:

Can Other People Change Who We Are?

Project Overview:

This project is designed to help students read for meaning and learn the importance of identifying with characters while they read. Students will read literature that deals with ideas of personal identity and how people decide who and what they are. Students will read these stories and then apply them to their own lives. Students will make use of their writer's notebook throughout the course of this project as they take examples from literature and apply the various types of character development to their own personal stories.

Student Goals

- Students will learn to read for meaning, paying specific attention to ideas surrounding character development.
- Students will make predictions about characters in literature based on prior knowledge and compare those predictions to actual events in the stories.
- Students will reflect on their reading to evaluate characters in the books and the reasons why they behaved the way they did.
- Students will apply the techniques used in the literature to their own writing and experiences and will write about themselves and what forces help to change who they are as people.

Student Motivation/Mini-Lesson:

Introduce the idea of how people and circumstances can affect students' lives. Stress that life is shaped by outside forces that often are out of an individual's control. Ask students to think about what those forces are and to organize them in an idea web. Since this is a fairly advanced topic, students' responses may not be that extensive. Students should have at least a basic understanding of how different forces can affect their life and who they are as people.

Materials Needed

- *Stella Luna* by Janell Cannon

- Choose at least one of the following books:
Adventures of a Taxi Dog by Debra and Sal Barracca;
The Three Robbers by Tomi Ungerer;
The Relatives Came by Cynthia Rylant;
George and Martha by James Marshall; or
The Black Heart of Indri by Dorothy Hoge

Project Activities

1. READ *STELLA LUNA*

Introduce the book by asking students about the differences between bats and birds. If students are not sure, have them consider the difference between other animals that are alike but also have many differences. Summarize the difference between bats and birds and tell students that these differences will be very important in the story. **Before reading the story, ask students to keep track of how the main character's life changes at the beginning of the book and what effect this has on the character for the rest of the story. Read *Stella Luna.*** As in the "Growing Up" lesson, students should list the changes and the results of those changes that occur in *Stella Luna*. Begin the final discussion by re-reading the following quote from *Stella Luna*: **"How can we be so different and so much alike?"** Ask students how they would answer that question if they were one of the birds. Ask students to write down—based on their chart of changes in the story—what they think the "hidden" message of the story is.

Note: Stella Luna examines the life of a young bat that is attacked by an owl and is separated from his mother. The bat is adopted by a bird family who raises her and teaches her the bird ways. When she is reunited with her mother, she shows her bird habits and her mom teaches her how bats behave. She returns to the birds and shows them the ways of bats.

2. REINFORCE *STELLA LUNA* WITH A SECOND BOOK

Have students select a second book that explores many of the same ideas and themes brought up in *Stella Luna*. Before students read their second book, **discuss the difference between good and evil.** Ask students if they have ever talked someone out of doing the wrong thing or if the students themselves have ever been talked out of doing the wrong thing. **Students should chart the changes that occur in the life of the main character(s) during the course of the story**. As students list these changes, they will be able to go back into the story and look for the deeper, "hidden" meanings. **Have students write down what they think the main message of the book is.**

Note: The story *The Three Robbers* is an excellent picture book that discusses the unexpected influence that young people can have on others. The book centers on three robbers who are constantly stealing from people in the town. One day, they rob a carriage only to find a young girl who is being shipped to live with her evil relative. She is abducted by the robbers and succeeds in changing them so that they spend all of their wealth rescuing other forgotten children.

3. LET STUDENTS CHOOSE A THIRD BOOK

Have students select a third book that explores many of the same ideas and themes brought up the first two picture books. Pre-reading for this book should include a brief discussion of fairy tales and magical spells. **Discuss the idea of virtue. Have students chart the changes that occur in the main character's life during the course of the story.** As students list these changes they will be able to go back into the story and look for the deeper meaning of the story.

Project Wrap-Up & Enrichment

Students will now have completed three stories about people whose lives are changed for the better by others. Have students compare and contrast these three stories. A possible wrap-up writing assignment could answer the following questions: Who helped change the three main characters? How did they do it? Have you ever helped change someone? Has anyone ever changed you?

Finally, ask students to consider how the lives of these characters would have been different if they had not met the person who changed them. For example: What would Stella Luna's life have been like if she had not fallen in the bird's nest? Students may wish to write a story based on the idea that the main character(s) did not meet anyone who could change them. As students write up these responses, they should consider what these stories tell us about meeting different kinds of people. Ask students if the authors of these stories think that everyone should be the same or if there are benefits to meeting people who think differently.

Students interested in completing an end-of-curriculum presentation on this project might want to write their own personal story about someone who changed their life or vice-versa. The story could be done in a picture book format. Students could also create a fictional fairy-tale, like *The Black Heart of Indri*, that highlights the same theme of influencing other people for the better.

Tips for Increasing the Difficulty of the Project:

Students may want to go directly from *Stella Luna* to a more difficult book. Advanced students could pay special attention to what the authors are saying about meeting people who think differently. Introduce the concept of diversity and ask students to consider how it impacts these stories.

Tips for Decreasing the Difficulty of the Project:

Students could end the project with *The Three Robbers* or choose to read *Adventures of a Taxi Dog*, which is very easy reading, instead of a harder book. Have students complete the project with a graphic organizer instead of essay questions. The graphic organizer could be a Cause and Effect Chart or Cartoon that shows the main character before the changes in the book and after.

CHANGING MOODS & EMOTIONS:

Why People Change the Way They Feel

Project Overview:
This project will use literature and the personal experiences of students to evaluate the changing nature of people's emotions and feelings. By reading stories that focus on emotions and writing personal entries in their writer's notebook, students will gain an understanding of the causes and effects of different moods and feelings. Students will build on many of the ideas and circumstances they read about in different stories to create personal writer's notebook entries that deal with the challenges in their own lives. Students will also look back on books and stories they have read to compile a class list of books that deal with a whole host of emotions.

Student Goals

- Students will read for meaning and will pay special attention to the emotions of characters and how they change throughout the story.
- Students will apply the ideas and themes they find in the stories they read to their own writing and will write with a particular emphasis on expressing their feelings and opinions about different events.
- Students will reflect back on prior knowledge to select books they have previously read or encountered that deal with emotions with which students identified.
- Students will reinforce the idea of "reading between the lines" or making inferences, by making judgements about the emotions and moods of the characters they read about in stories.

Student Motivation/Mini-Lesson:

Begin the lesson by asking students what it means to be in a good mood or a bad mood. How do you know when somebody else is in a good or bad mood? Ask what other kinds of emotions people can have that cause them to be in good or bad moods. Help students list as many different types of emotions as they can. Ask students to decide whether each emotion puts them in a good or bad mood. For example after students mention the emotion of fear, ask if they like being afraid and what their mood is like when they are afraid. After students have exhausted the list of emotions, help them understand that the emotions we feel on the inside can have a very big impact on the person we show on the outside. Introduce the books, stories and poems in this project as examples of how people react to changes in their lives. The books will look at the emotions people feel when things happen to them and how they show those emotions to the outside world through their moods.

Materials Needed

- *Feelings* by Aliki
- *True Story of the Three Little Pigs* by Jon Scieszka
- *Corduroy* by Don Freeman
- *Life Doesn't Frighten Me at All* by Maya Angelou
- *Alexander and the Terrible, Horrible, No Good, Very Bad Day* by Judith Viorst
- *Dandelions* by Eve Bunting and Greg Shed
- *When I was Young in the Mountains* by Cynthia Rylant

Note: The book list above is only meant as a guide. There is no shortage of excellent books that deal with emotions.

Project Activities

1. START BY READING TOGETHER

Begin the project by reading entries in *Feelings* by Aliki. This book contains a number of stories and parables all designed to focus on different emotions. Each story is very short and could be read to the whole class as a way to generate initial discussion on feelings and emotions. **As students discuss the various episodes from this book, ask them to think about what caused the person to change his or her mood.** If someone was unhappy, how did someone else cheer him or her up? How did one of the characters hurt another person's feelings? Students should gain a perspective on what causes people to have changing moods, emotions and feelings.

2. HELP STUDENTS IDENTIFY EMOTIONS AND MOODS IN WHAT THEY READ

Encourage students to create an idea web that will center on the primary emotion developed in the story or stories they choose to read. The idea webs will have the name of the central emotion in the book at its center. Each branch of the idea web will be an event or character in the book that caused someone to feel that emotion. (See the Introduction's Explanation of Common Terms for a description of idea webs.)

BOOK SUMMARIES AND DESCRIPTIONS OF CORRESPONDING IDEA WEBS

Life Doesn't Frighten Me at All, one of the simpler books, shows how the mysterious things that go bump in the dark need not be scary. The contrasting emotions of fear and confidence appear in this book. Have students create an idea web based on these two emotions: one chart which documents the causes of fear; the other which documents the causes of self-confidence and bravery. For example, the main emotion at the center will be "fear." Each branch of the idea web will be one potential cause of fear mentioned in the book such as "the first day at a new school."

Alexander and the Terrible, Horrible, No Good, Very Bad Day centers on being grumpy, sad or "bummed out." Alexander has a terrible day and wants to leave for Australia. His mother helps him realize that no matter where you go there will be bad days. The chart should focus on anger and depression and their causes.

When I Was Young in the Mountains is primarily concerned with being happy. Most of the descriptions in the book are about the author's favorite childhood memories. The idea web should list all the causes of happiness in the book.

The True Story of the Three Little Pigs is a very funny story about how the wolf explains everything that happens in *The Three Little Pigs*. The central feature in this book will be humor, the wolf thinks nothing is his fault and the whole story is a big misunderstanding. The sources of humor should be listed on the idea web.

Corduroy describes the loneliness of a little bear locked away in a toy store. The bear is eventually rescued by a young girl. Loneliness and its causes would be charted for this book.

Dandelions is also an excellent source for an exploration of loneliness.

Project Wrap-Up & Enrichment

Students should now have at least three, and as many as five, "emotions webs" based on the stories they read for this project. Students should now look at all of the emotions they have covered and see if there are important emotions they think are missing. If emotions are missing, have them research one more story to complete the full circle of different emotions.

Once students have all the "major" emotions covered, they should pick their favorite character in any one of the stories they have read and transplant that character into the action of another story. They will then write a short story about how this character, who usually feels certain emotions, would fare in this new world. A good example might be transplanting Alexander into the story *When I Was Young in the Mountains*. This could be an interesting tale of a boy who is usually depressed coming into one happy event after another. Would fun experiences change his emotions or would they stay the same? For this to work best, have students put characters into books that center around emotions that are nearly opposite to those experienced by the characters in their original story.

Students wishing to complete an end-of-curriculum presentation on this project might wish to expand this wrap-up activity where a certain character visits all of the other stories read for this project.

Tips for Increasing the Difficulty of the Project:

Have students chart more difficult books that contain more complex emotions. A number of books that were used in earlier projects could be used for this purpose. *The Giving Tree*, *Hope for the Flowers* and *House on Mango Street* are all powerful books where the emotions are complex and sometimes conflicting. Once students complete an emotions web for one of these more complex stories, have them write an explanation of how some of these stories describe more than one emotion going on at the same time.

Tips for Decreasing the Difficulty of the Project:

Let students end the project at the point where they have made "emotions webs" for each of the books they have read.

CHANGING WEATHER

Project Overview:
Students will engage in a process of observation and discovery designed to highlight the various natural elements that shape weather. Once these elements are better understood, students will apply this knowledge in an effort to predict the changes that occur in weather from day to day and month to month. Rather than engaging in a detailed study of many different types of weather or various climates, this project will rely heavily on the observed changes happening to the weather each day.

This project is meant as the beginning of a more detailed study of the environment and nature. Later lessons in the **Science and Math Section** will come back to many of the scientific ideas raised in this introduction to the forces of weather and nature, and therefore should follow "Changing Weather."

Student Goals

- Students will understand the basic forces of weather and how they interact.
- Students will begin to see how change is often the result of many different, independent factors all coming together at the same time. Students will chart the changes and understand their various causes.
- Students will learn to make predictions based on evidence and "cause and effect" patterns.

Student Motivation/Mini-Lesson:

"Changing Weather" will engage students in a first-hand study of the weather they deal with each day as they go to school and play outside. The focus of this unit will be on constant student observation and experimentation. Get students outside and involved in the process of scientific discovery so they become familiar with experimentation through activities which highlight the elements necessary to predict what future days may have in store.

Ask students to brainstorm, in the form of an idea web, about all of the different things that go into making weather. Expected responses should include: rain, wind, snow, sunshine, clouds, temperature, etc. Once this list is completed, set up the idea that weather is constantly changing and that there is a great need for people to try and predict what weather will be like in order to prepare for what lies ahead. Urge students to consider why it would be important to predict weather before it happens.

Materials Needed*

*See Appendix D for a detailed list of materials needed to build different weather devices

- Modeling clay, rubber bands, tape, glue and paper cups
- Large construction paper
- Thermometer
- Rulers
- Weather maps from the newspaper
- Small pieces of newspaper with as little print on them as possible

Project Activities

1. BRAINSTORM ABOUT THE WEATHER

Help students create an idea web of the different things that help make weather. From the idea web, students can brainstorm about the importance of trying to predict what the weather will be in the future. **Stress the changing nature of weather.**

2. HELP STUDENTS CONSTRUCT WEATHER PREDICTION DEVICES

Have students construct one or more of the following weather prediction devices: a weather vane; a wind gauge (anemometer); a rain collector; and a sun gauge (a piece of newspaper that will yellow if the sun shines, to be replaced each day). Students will also use a thermometer and basic methods of observation. **Once weather prediction devices are constructed, have students set up a small weather prediction station outside.** Make sure that the area is subject to as many weather factors (wind, rain and sun) as possible.

Note: For detailed instructions on how to build these and other weather-related devices, see Appendix D.

3. HAVE STUDENTS CREATE AND KEEP WEATHER LOGS

Have students create a weather log for the coming week. Each day, **instruct students to observe the weather and write a general description of their observations, read the weather prediction devices and record the wind speed** (on a scale of none, slow, medium or fast), **outside temperature, rainfall and change in color of the newspaper** (which will indicate if the sun was out). Once the weather log is completed, have students make a prediction of what they think the weather will be like the next day. Encourage students to consider what each device might tell us about the future.

4. USE THE NEWSPAPER TO COMPLEMENT STUDENTS' OBSERVATIONS

Have students look in the newspaper to see what the weather prediction was for each day. This will be the final piece of each weather log. A log in process (as of September 5th) would look like:

Date	Wind Speed	Temp	Rainfall	Sunshine	Observation	My Prediction	Paper Prediction
9/5	Medium	65	None	Yellow paper	Cool & Sunny Fluffy Clouds	Warm & Rain High 80	Cool & Sunny High 70
9/6						Cool & Sunny Windy, 60	Light Rain, High 70

The completed log will have actual weather descriptions and predictions for the entire week. Lastly, **have students analyze who was better at predicting the weather: the newspaper, other classmates or themselves.**

Project Wrap-Up & Enrichment

Have students write up their thoughts on what is needed to predict the weather and what they learned about the weather and predicting what will happen next. Brainstorm with students about what devices professional weather people use to help predict the weather more accurately. If possible, have a speaker who is an expert on weather prediction visit the classroom and discuss the tools he or she uses to make predictions. Reinforce the idea that many different influences affect the weather and make changes happen. For example, discuss how two elements, such as a great deal of wind and dark clouds rolling in, combine to make a storm.

For students who are especially interested in this project, suggest they consider doing a weather report for a made-up television station. This could serve as their end-of-curriculum presentation. Students could draw a local or national map and conduct a full weather report using their different weather gauges (taped on VCR or cassette if possible). Finally, this unit is also well suited to reading material—from books on snowy days to sunny skies—as well as to writing stories and poems about the wind and rain.

Tips for Increasing the Difficulty of the Project:

Let some students build the weather center with minimal teacher assistance, using the instructions in Appendix D as a guideline. For the prediction phase, encourage students to include evidence that supports their predictions. To do this they might need to read more about the basics of weather forecasting.

Tips for Decreasing the Difficulty of the Project:

Pre-construct the weather center. In addition, come up with some basic rules of weather forecasting. This could be done in a number of "If…Then" statements having to do with the various elements being measured. For example, "If it is warm and the wind is from the West, then it will likely rain." Compiling this kind of list is possible from reading a weather map in any newspaper.

CHANGING SEASONS

Project Overview:
Students will study the seasons by following how trees change and adapt during different seasons. Students will "adopt" a tree in a nearby park and record the changes they observe in the tree over time. From these observations, students will learn the basics of why seasons change and how the world adapts to that change. Unlike other projects which can be accomplished in several consecutive lessons, this project will work best if it is spread over a large part of the entire curriculum. This way students will be able to observe more substantial changes to the tree than they would in just a few weeks. This lesson can be revisited in the spring and summer so students can continue to see how the tree adapts to meet the conditions around it.

Student Goals

- Students will make observations and record data.
- Students will make comparisons.
- Students will make inferences about why changes occur and draw conclusions.
- Students will communicate observations and findings.

Student Motivation/Mini-Lesson:

Ask students for their thoughts about trees. Create a list or idea web with students as they share what they know and like about trees—trees they have climbed, picked fruit from, seen birds nests in, watched squirrels run up, sat under on a hot and sunny day, swung beneath on a swing or even planted. Lead discussion to basic understandings of the many different kinds of trees that exist and how they offer people and animals many different things—from shade, to play, to food. Follow this with a discussion of the physical characteristics of trees. Encourage observations on size, bark texture, color and whether the tree has leaves or needles, fruit, nuts and/or flowers. If the tree has leaves, what are the shape, size and color of the leaves?

Tell students that today they are going to “adopt a tree" and be scientists who observe and study that tree to learn what special characteristics it has. They are then going to draw and write about their tree in order to introduce it to others.

Materials Needed

- A tree for every student or pair of students
- Drawing paper and something to put paper on so students can draw and write outside
- Pencils, crayons or colored markers and a bag or box for students' materials
- Clear contact paper
- Storybooks for follow-up: *The Man Who Talked to a Tree* by Byrd Baylor; *Oak and Company* by Richard Mabey; *The Giving Tree* by Shel Silverstein; *Tree Flowers* by Millicent E. Selsam
- Something for students to sit on if they go out on wet or muddy days (optional)

Project Activities

1. PREPARE STUDENTS FOR OBSERVING

Tell students to make observations like a scientist and carefully use their eyes to study the whole tree, from the very top to the very bottom. Have students look to see what the tree's physical features are: Does it have a smooth or rough trunk? Long willowy branches or short stumpy branches? Does it "weep" or have a rounded top? Does it have a pointed, narrow top? Are there leaves or needles? What exactly do the leaves or needles look like? Does it have any flowers, nuts, pine cones or other things growing? Do any animals use the tree or even live in the tree?

2. PREPARE STUDENTS TO DOCUMENT THEIR OBSERVATIONS

Tell students they will document their observations like a scientist so that they can remember what they saw and share their findings with other people. **Give students a bag or box that contains the materials they need to document their "adopted" tree. Ways they can document their observations include making a bark rubbing or a rubbing of a leaf or needle, drawing a leaf** (taking special note of the pattern of its "veins"), **drawing the entire tree** (paying attention to how it branches and whether its leaves grow in groups or on single stems), **drawing the tree's flowers, nuts or fruit, drawing any animals** they see in the tree, **drawing any animals' homes** (nests, etc.) or **sealing leaves, needles and twig samples** between pieces of clear contact paper.

Note: It may be necessary to demonstrate how to do some of the strategies, such as how to seal leaves and twigs in contact paper or how to do rubbings, for students.

3. HELP STUDENTS MAKE AND DOCUMENT THEIR OBSERVATIONS

Go outdoors and let students study their "adopted" tree. Give them some guidance every ten minutes or so and suggest that they move on to a different documentation activity. **Repeat this exercise at three to four week intervals.** Tell students to pay special attention to any changes they observe in their tree from one visit to the next.

Note: If students are working in pairs, let them get together before they go outside. They can then plan whether they are going to split up tasks or if they will each do every activity.

4. DISCUSS STUDENTS' FINDINGS

At the conclusion of the final visit, **discuss the changes students observed in their trees.** Ask students for their thoughts on what caused these changes.

Note: It may be instructive to give a brief overview of why the seasons change. This topic will be covered in greater detail in other projects, but students should have a general understanding that the sun's rays are not as direct in the late fall and winter and the earth gets colder when this happens.

Project Wrap-Up & Enrichment

Students may need some extra time to document their observations and complete their activities inside the classroom. Give students time to practice presenting their drawings, rubbings, contact-paper-sealed samples and writing before students make their presentations to the group. Make sure that they understand characteristics of all trees, physical features of different kinds of trees, how people and animals enjoy and use trees and how and why trees change and adapt to the seasons. Students might showcase their work with an exhibit of their drawings and other artifacts for their end-of-curriculum presentation. Or students may compile their work into a big scrapbook or may study their tree for a year to see and draw how it changes from season to season

Note: Guest speakers and/or field trips could greatly enhance this activity. Invite a landscaper, nursery owner or park ranger to come and share information about trees and about their careers. From a guest speaker, students can learn how important trees are—to prevent soil erosion, provide shade and winter wind breaks, produce oxygen—and more about topics such as logging and rain forest issues. Contact a county conservationist or another group in the community that plants seedlings every year and see if students may get involved in planting. Have students use a field guide or reference book to learn more about their particular kind of tree (the U.S. Government Printing Office is an inexpensive source of such guides). See if a group taps maple trees for syrup in the area and would let students get involved in the process of making maple syrup.

In the cycles project ("Understanding Cycles") students will be asked to consider the cyclical nature of the seasons. During this process, they will use their pre-existing knowledge of the seasons to make predictions on how the tree will look in the winter and spring. Possibly revisit this project in the winter and spring so that students can compare their predictions to actual observations.

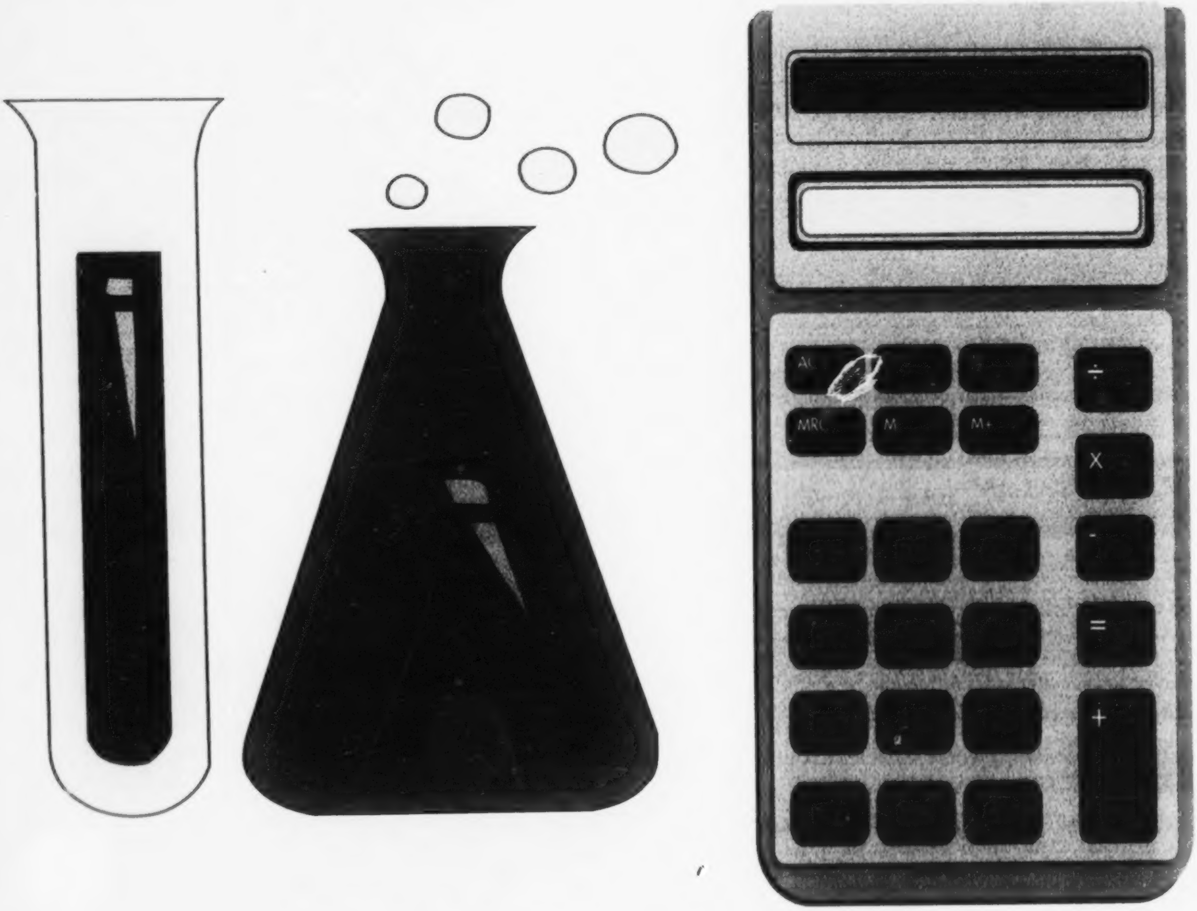
Tips for Increasing the Difficulty of the Project:

Ask students to identify the type of tree they have selected. Using a tree guide (mentioned in the *Note* above), students can match the basic characteristics of their tree with those in the book. Also, ask students to do more sophisticated measurements of the tree: diameter of the trunk; number of branches; estimated height of the tree; estimated age of the tree. Finally, students could be asked to identify other students' "adopted" trees that are of different species.

Tips for Decreasing the Difficulty of the Project:

Have the entire class or group "adopt" one tree together. In this way, it becomes possible to sit with the entire group and lead the various activities. Bring out a writing tablet and list student responses to each activity. Also, demonstrate each activity on the "adopted" tree before the students have to do the activity themselves.

SCIENCE and MATH



CHANGING COLORS

Project Overview:
Students will discuss the role of colors in the world. They will conduct between two and four experiments that demonstrate how primary and secondary colors interact.

Student Goals

- Students will learn about the different properties of colors.
- Students will see how colors play an important role in shaping the world around them.
- Students will see how different elements can combine to make change.
- Students will begin to learn the basics of the scientific method of experimentation.

Student Motivation/Mini-Lesson:

The project will be introduced through a discussion of colors and their significance in the world. Complete two different idea webs: one where students brainstorm as many colors as possible; and another where, using the first idea web as a guide, students match each color to something important in nature or society (i.e. blue sky, red light, green grass).

From this initial discussion of colors, introduce students to the idea of changing colors and how new colors can give us information about what is happening in the world. Point out ideas like the colors of the sunset, a bruise on your arm and food that turns green. At this point, introduce the idea of primary and secondary colors and how certain colors can combine to create new ones. This would be an ideal point to restate a common observation about change: that it is often the result of two different things coming together at the same time.

Materials Needed

- 1 worksheet for each student labeled with colors
- Play Doh—1 container each of red, yellow and blue
  (Approximately 6 ounces of each for a class of 25 students)
- White frosting; red, blue and yellow food coloring; mixing bowls; 3 spoons; 3 measuring teaspoons; graham crackers; napkins; typing paper
- Red, yellow and blue cellophane, and popsicle sticks
  (for mixing icing and creating a cellophane color paddle)

Project Activities

1. INTRODUCE STUDENTS TO PRIMARY AND SECONDARY COLORS

This lesson is adapted from Ms. Lois Ann Lynn of Rosamond, Utah

Have each student create a worksheet that is divided into six roughly equal spaces. Give each student one piece of red, yellow and blue Play Doh, about the size of a ping pong ball. **Instruct students to break each color into 3 equal pieces** and place these on their desk. Pass out basic color sheet to each student. **Have students press one small piece of yellow Play Doh onto the worksheet and label that section "yellow." Repeat with red and blue. Have students take one piece of yellow and one of blue and squeeze them together until they turn green. Direct students to press it above the word "green" on their worksheet. Complete the worksheet by combining red with yellow to make orange and red with blue to make purple.**

Note: The primary colors are: red; yellow; and blue. Secondary colors are made as follows: red + blue = purple; red + yellow = orange: yellow + blue = green. Do not tell the students what is going to happen when they combine the two colors. Let them discover it. Allow Play Doh one or two days to dry.

2. REINFORCE WITH A HANDS-ON ACTIVITY: FROSTING

This lesson is adapted from Nancy Martin and Barb Hawkins, Midway Schools, Denton, KS.

Give each student two graham crackers. Have each student leave one whole and break the other into fourths. **Have students mix red and blue frosting on one part of the cracker using a Popsicle stick.** Let the students predict what color will be made with red and yellow. **Repeat with red and yellow, yellow and blue, and blue and red and yellow.** Let the students predict what will happen each time.

Note: Mix the frosting beforehand: one cup red, one cup yellow, one cup blue.

3. REINFORCE WITH ANOTHER HANDS-ON ACTIVITY: COLOR PADDLES

Instruct each student to make his or her own color paddles out of red, blue and yellow cellophane in Popsicle stick frames. Have students "mix" colors by holding color paddles together. Ask students to explain what happens when they hold individual paddles over each other and over various colored pictures. **Have students draw their own colored design using different mediums and look at the designs through different paddles.**

4. REINFORCE WITH A FINAL HANDS-ON ACTIVITY: COLORED WATER

Have students **make colored water** with the red, blue and yellow food coloring. Instruct students to **mix colored water together and see what colors mixing produces.**

Project Wrap-Up & Enrichment

Students will have gained a sense of how colors play an important role in giving information to people. Through the activities, students will also have a sense of the physical properties of colors and how they interact to form new colors. Students will have made a number of new items that they can include in their portfolio. The color worksheet as well as the color paddles can be combined with students' observations on the experiments they conducted using Play-Doh, frosting, cellophane and colored water.

Suggest that students who are particularly interested in the physical science aspect of light and colors consider the exercises in Appendix E—Light and Color Experiments—as part of their end-of-curriculum presentation.

Tips for Increasing the Difficulty of the Project:

Since this lesson explains the very basics of colors and how they interrelate with each other, it may make sense to have more advanced students complete the different set of experiments listed in Appendix E. These exercises deal more with the scientific properties of color—especially those of black and white. Have students relate these exercises to the central ideas of changing colors introduced in this project.

Tips for Decreasing the Difficulty of the Project:

For the Play Doh activity, label the worksheet with all of the primary and secondary colors beforehand so that students only need to match their Play Doh with the corresponding colors on the worksheet.

CHANGING PEANUTS INTO PEANUT BUTTER

Project Overview:
This project can be a fun and fairly brief activity that demonstrates how raw materials are changed into familiar finished products. Students will learn the basics behind making peanut butter, including ingredients and the sequential steps involved. Students will observe a manufacturing process that produces a familiar and favorite food. At the conclusion of the activity, students will be given a small jar and a piece of paper to make a label for their peanut butter.

Note: Carol Hurst's Children's Literature Site (see Appendix C) includes an activity that demonstrates how to make paper. The resources required to do this activity are considerable, but it can be a terrific addition or substitute for this project: Changing Wood into Paper.

Student Goals

- Students will understand the basics of the manufacturing process by observing how familiar raw materials are mixed together to create another familiar product.
- Students will learn the properties of peanuts that allow them to change to another form and the concept of friction.
- Students will learn the need for precise measurement and sequencing when manufacturing products.
- Students will learn the basics of labeling and promoting products by designing the packaging for their peanut butter.

Student Motivation/Mini-Lesson:

Tell students that today they will learn how to make peanut butter. Ask students what kind of peanut butter brands they are familiar with and what those labels look like. Tell the students that they are going to compete with these brands by making their own peanut butter and designing their own label. Explain to students that what they are about to do is the same "manufacturing" process that big companies, like JIF, use to create peanut butter except on a smaller scale. Go over the idea and definition of manufacturing—taking raw materials through a process that changes them into another useful item.

Materials Needed

- A standard blender
- A few jars of a name brand peanut butter
- 10 re-sealable containers
  (ask a restaurant for "to go" soup containers)
- Strips of white paper to serve as labels for peanut butter containers
- Ingredients for one jar of peanut butter:
  - 2 cups of roasted peanuts
  - 2 teaspoons of oil (peanut oil is preferred)
  - 1 tablespoon sugar
  - 1 teaspoon salt

Note: An example of an unroasted peanut would also be helpful

Project Activities

1. BRAINSTORM ABOUT HOW STUDENTS THINK PEANUT BUTTER IS MADE

Ask students what they think they will need to make peanut butter. Guide students' thoughts on what will be needed when they get stuck. Good clues would be: What will help the peanuts get gooey? What does your mom or dad add to food to make it taste better? **Ask students how they think peanut butter is made.** Take down as many ideas as students can come up with and list them on the board. **Now take out all of the materials necessary to make the peanut butter and compare them to the ingredients the students suggested.**

2. MAKE PEANUT BUTTER

Explain the peanut-butter-making process while the peanut butter is being made.

Pour the (peanut) oil into the blender. Explain to the students that this oil is called a lubricant, and just as oil helps a car engine run, putting oil in the blender helps the peanuts slide around and get mixed together. Without the oil, the friction would be too much and would burn the peanuts.

Add one quarter (half a cup) of the peanuts into the blender. Mention to the students that it is necessary to use roasted or cooked peanuts. Peanuts that have not been roasted taste awful while roasting or cooking brings out the sugars in peanuts and makes them taste good. Give students a taste of unroasted peanuts if available.

Begin mixing the peanuts and oil. Put the blender on a slower setting like chop. Push the peanuts around with a plastic spatula. Once the peanuts are mixed, slowly add more until all two cups are thoroughly mixed together.

Add the salt and sugar to the mix.

Run the blender for two minutes until the mixture is smooth. To make chunky peanut butter, simply add more peanuts into the mix now and run the blender for a few more seconds, then stop.

Pour out the contents into the students' containers; caution the students that the peanut butter will be very warm because of all the friction the blender produced. The easiest way to demonstrate friction is to have students rub their hands together until they get hot.

Note: Walk through the peanut butter making process at least once before doing it with the class.

3. SHOW STUDENTS HOW TO "SELL" THEIR PEANUT BUTTER

Have students make labels for their peanut butter, listing the ingredients and possibly giving the nutritional information. Suggest that they look at examples of name brand peanut butter (JIF, Skippy) for ideas. Tell students it is important that their labels make the product appealing so people will want to buy it. Have students affix their labels to their peanut butter container. They have now made a product to sell in stores! If desired, give awards for the best labels.

Project Wrap-Up & Enrichment

Have students write down the steps of the manufacturing process. Tell students it is important for them to list all of the ingredients and carefully outline each step in order. They should explain how the peanut changed into something new called peanut butter and give a definition of what it means to manufacture something. Explain that the directions they make will be what their company uses to make peanut butter in the future. If they forget an ingredient or a step in the process, their company will not be able to make peanut butter correctly and no one will buy their peanut butter.

Students who are very excited about this process may want to demonstrate how to make peanut butter, with teacher supervision, as part of their end-of-curriculum presentation. Encourage students to make displays that show the ingredients and the steps of the process. They should also complete some research on the geography of peanut growing, the nutritional value of peanuts and facts on the peanut butter industry.

Tips for Increasing the Difficulty of the Project:

Supervise the students in making the peanut butter themselves. Print up the instructions and have the students carefully follow the procedure.

Note: DO NOT allow students to put anything in the blender!

Tips for Decreasing the Difficulty of the Project:

Students could just draw on the labels without having to include product information. Give students sentence strips of the various steps in the process and have them put the strips into the correct order rather than write down the ingredients and manufacturing process themselves.

ANIMALS AND BUGS THAT CHANGE

Project Overview:
This project involves setting up a science activity that allows students to observe a caterpillar changing into a butterfly. The purpose is to give students an appreciation of change in nature by teaching them about the life cycle of the butterfly.

Note: This project requires a butterfly kit which must be ordered a few weeks in advance. In addition, the metamorphosis of the caterpillar into a butterfly takes a few weeks. This project will need to be ongoing during the curriculum as students revisit the kit to make observations. Keep this in mind when scheduling this project.

Student Goals

- Students will read for meaning as they supplement their observations with non-fiction accounts of butterfly behavior.
- Students will gain additional literacy skills by reading fictional enrichment materials about butterflies. Students will see that authors can use basic natural facts as the basis for an imaginary story.
- Students will observe a natural phenomena, learn to keep records and charts of the changes they observe during the metamorphous of caterpillars to butterflies and share their findings with the entire class.
- Students will demonstrate their understanding and appreciation of butterflies through artistic activities designed to have students share their impressions of the process they observe.
- Students will compare and contrast butterflies and moths.

Student Motivation/Mini-Lesson:

Start the lesson by telling students that they will be studying the life cycle of a butterfly over the next few weeks. Tell students that the butterfly is one of the most amazing creatures in nature because it starts out as one thing and changes into something completely different.

Ask students how humans change from the time they are babies to the time they are adults. Once this initial discussion of change is completed, tell students that in order to better understand the significance of what happens to butterflies, they are going to read one author's idea of what the process of change is really about. Show the students the book *Hope for the Flowers* by Trina Paulus. After showing students some of the illustrations and reading the title, ask students what they think the book might be about. From these predictions, stress to students that much of the book deals with the idea of change that the class has been studying. Set students' purpose for reading by asking them to consider why the author thinks the change a caterpillar experiences is so important. At the end of the story, students will be responsible for writing down how the caterpillar felt about the change that occurred.

Materials Needed

- A butterfly kit
  Note: Kits are available through The Nature Store by mail or the Internet. These kits include 33 Painted Lady caterpillars with food, 33 vials and lids, an 18 inch butterfly house and complete instructions.
- *Hope for the Flowers* by Trina Paulus
- *Butterflies and Moths* by Paul Whalley (Eyewitness Books)
- *See How They Grow—Butterflies* by Mary Ling and Kim Taylor
- Optional enrichment book list: *The Very Hungry Caterpillar* by Eric Carle; *Now I Know...A Butterfly* by Troll; *The Life Cycle of the Butterfly* by Paula Hogan; *Amazing World of Butterflies and Moths* by Louis Sabin and Jean Helmer
- A science video on the life cycle of butterflies
  Suggested title: *Butterfly World: Jewels of the Sky* (available at The Nature Store)

Project Activities

1. RESEARCH HOW CATERPILLARS BECOME BUTTERFLIES

Have students begin with a sequencing diagram on the life cycle of a butterfly: from eggs on a leaf, to the caterpillar stage, to the pupa or chrysalis stage, to the adult butterfly stage. Make sure students clearly label each section of the diagram. **Have students estimate the number of days between the caterpillar and chrysalis stage, and between the chrysalis and butterfly stage.** Instruct students to compare the different kinds of butterflies: monarch, red admiral, tiger swallowtail, common sulfur and painted lady. **Have students draw and color each of these kinds and label the six parts of the butterfly.** Teach students the differences between butterflies and moths. **Have students make up a graphic organizer that lists similarities and dissimilarities between butterflies and moths.** A Venn diagram is often useful for these purposes.

Note: The *World Book of Science*, *See How They Grow—Butterflies* and *Butterflies and Moths* serve as helpful guides and sources for research.

2. HAVE STUDENTS OBSERVE CHANGES AND DOCUMENT THOSE CHANGES

Have students keep a scientific journal to document and chart the growth and change they observe in the caterpillar. Instruct students to observe the caterpillar as it gets bigger and its segments become easier to see. **Have students try to distinguish all twelve segments and draw and label the caterpillar, or make a paper caterpillar, including the twelve segments plus the head and tail. Tell students to continue drawing and documenting the changes they observe as the caterpillar moves from the pupa stage to the chrysalis stage.** As the chrysalis starts to turn black and transparent, have students predict which of the chrysalis will become a butterfly first. **As the chrysalis finally turns into a butterfly, students should be careful to document exactly what they see.** Students will now have a well-documented scientific journal that has carefully recorded, in pictures and in words, the changes they observed.

3. HELP STUDENTS SUMMARIZE ALL THE CHANGES THEY OBSERVED

Have students put together a detailed chart (similar to the one they created before the experiment) that documents all of the activities they observed using the butterfly kit. Students should include their observations and thoughts during the process. They should also include comparisons between what they predicted was going to happen and what actually took place.

Project Wrap-Up & Enrichment

Students should reflect back to the very beginning of the project and remember what the caterpillars looked like and what they became. As a class, students should talk about these changes and how they tie into the ideas raised in *Hope for the Flowers*. Tie this activity into the concept of cycles (studied in detail in "Understanding Cycles") and how caterpillars turn into butterflies every year, year after year. When the time comes to release the butterflies into their natural habitat, students may want to write a special song or poem about the butterflies they raised.

Have students who would like to include this project as part of their end-of-curriculum presentation take special care in compiling and producing the chart in Project Activity #3. An excellent chart would include pictures and personal observations, as well as evidence of using research materials to answer difficult questions about the changing process.

Other enrichment activities for students who are especially interested in this project or want to complete a butterfly end-of-curriculum presentation include: making a construction paper caterpillar which opens up to be a butterfly; making caterpillar books in the shape of a caterpillar or making butterfly books in the shape of a butterfly; using their knowledge of butterflies and ideas in *Hope for the Flowers* to write a story about what happens to a caterpillar from the caterpillar's point of view; writing butterfly poems or songs.

Tips for Increasing the Difficulty of the Project:

More complexity could be added by requiring students to use ample evidence from various reference books to conduct an in-depth research assignment on the life cycle of a common butterfly. At each stage of the metamorphous from caterpillar to butterfly, have students diagram and explain the process in scientific terms.

Tips for Decreasing the Difficulty of the Project:

Observe the butterfly kit with the entire class and use it as a demonstration model. In this way the entire class would be sure to notice important changes occurring to the cocoon. This approach would also be helpful in regulating how often and when students would go back and check on the butterfly kit throughout the course of this lesson. Also, students could simply chart their observations on the process without conducting the preliminary research mentioned in Project Activity #1. Students would diagram what they saw and include whatever observations came to mind as they witnessed the change.

EVENTS THAT CHANGED THE WORLD:

Discovering Electricity

Project Overview:

This project will evaluate the changes brought about by technological advances. The discovery of electricity illustrates this so well because of electricity's immense impact on students' lives. Students will first learn the basic facts behind the discovery of electricity and its first uses. From this background knowledge, students will see how electricity allowed for the introduction of many new inventions, devices and ways of doing things. Students will then conduct an activity in which they will chart all of the different ways they use electricity in a given day. The final piece of the project will let students apply their learning by considering how different their own lives would be without the discovery of electricity.

Student Goals

- Students will learn the basic facts behind the discovery of electricity and gain a general understanding of how electric forces work.
- Students will see, using electricity as the prime example, how technological change can shape how people conduct their lives.
- Students will learn about the realities of life before electricity.
- Students will document their own activities to understand how they use electricity constantly throughout their day.
- Students will apply their learning to create a fictional world where they would live without electricity.

Student Motivation/Mini-Lesson:

Have students complete an idea web about electricity—particularly about how the students think it works. Once these ideas are gathered, take the useful ideas from the web and build a fairly simplified version of how electricity works. This discussion could start with a general discussion about atoms, small things that compose every object we know on earth. From there, explain that electricity works by shaking these atoms up and forcing them to throw off pieces of their outer parts called electrons. When electrons all start moving in the same direction, they can help power things. Possibly draw the basic model of a generator, which stirs electrons in the same direction.

After this initial discussion and drawing, students should watch the SchoolHouse Rock video "Electricity, Electricity." The words to the song are included in Appendix M. Students should take special note of how the generator in the video looks and how it compares to their drawing. They should also pay attention to the various things the video mentions that use electricity to work.

Materials Needed

- Basic circuit-making materials: small light bulb; circuit box; wires; battery

  Note: Kits are available at Radio Shack or another local electronic store.

- SchoolHouse Rock Video "Electricity, Electricity"

  Note: See Appendix M for song lyrics.

- Information on Benjamin Franklin and electricity

  Note: See Project Activity #1, Appendix F or *Benjamin Franklin* by Carole Greene for additional information on electricity and Benjamin Franklin.

- Appendix F: Advanced Electricity Experiment (optional)

- Electricity Books: *Electricity*—Eyewitness Science Books; World Book Science; *The Light Bulb and How it Changed the World* by Michael Pollard; *What Was It Like before Electricity* by Carolyn Scrace and Paul Bennett

Project Activities

1. INTRODUCE BENJAMIN FRANKLIN'S DISCOVERY OF ELECTRICITY

Have students read about how Benjamin Franklin "discovered" electricity. Did Ben Franklin really discover electricity? What did he do that was important with respect to electricity? How did his experiment help to change the world? To answer some of these questions, students may want to do additional research on electricity, Thomas Edison, Michael Faraday and Ben Franklin found in encyclopedias or in the books listed in the Materials Needed section.

Note: Below is a good explanation of Franklin's discovery, from the Franklin Science Museum in Philadelphia.

> Have you ever watched lightning during a storm? Have you ever wondered about its power? Have you ever wanted to know more about it? Ben Franklin did. Actually, Ben's interest in electricity was not just limited to lightning. He received an electricity tube from his friend Peter Collinson and began to play around with it, performing experiments. However, it is Ben's interest in lightning that we best remember.
>
> Ben suspected that lightning was an electrical current in nature, and he wanted to see if he was right. One way to test his idea would be to see if the lightning would pass through metal. He decided to use a metal key and looked around for a way to get the key up near the lightning. He used a child's toy, a kite, to prove that lightning is really a stream of electrified air, known today as plasma. His famous stormy kite flight in June of 1752 led him to develop many of the terms that we still use today when we talk about electricity: battery, conductor, condenser, charge, discharge, uncharged, negative, minus, plus, electric shock and electrician.
>
> Ben understood that lightning was very powerful, and he also knew that it was dangerous. That is why he also figured out a way to protect people, buildings and ships from it: the lightning rod. Have you ever heard of Ben's lightning bells? Ben was always looking for new ideas about electricity, since it was one of his favorite pastimes.
>
> Although electricity was just a hobby for Ben Franklin, he made many important contributions. Later scientists, like Michael Faraday and Thomas A. Edison, continued to study electricity using many of Ben's ideas. Even today, scientists are still studying electricity and learning more about it. Ben Franklin would be amazed at how important his stormy kite flight really was!

2. HELP STUDENTS THROUGH AN ELECTRICITY ACTIVITY

This lesson is adapted from a Columbia Education Center Summer Workshop

Prepare a kit ahead of time for each group of students. Each kit should include a brown lunch bag, one C cell battery, two insulated copper wires, one battery holder and two brass battery clips and one small flashlight bulb and socket. All these items must be separate and in random order in a closed bag. **Give each group a bag and allow 10 minutes for exploration.** Do not give any clues as to the use of the contents. When the exploration time is up, **stop for discussion.** Have students who were able to make a simple circuit explain what they did so others can follow. Talk about the concept of electricity, the flow of electrons through a conductor, what things are conductors, etc. Discuss where the electricity comes from, where it goes and how it makes the light bulb light. Discuss how the battery stores electricity. How do we know that electrons are flowing?

Note: Optional activities include having students draw and label what they have done in their science log or on a piece of paper, or giving each group of students a second battery and letting them experiment. Does the second battery change anything? Does the light get brighter or dimmer? Does the way the batteries are connected make any difference in the way the light works? Try different ways of connecting the batteries. At this time, stop and have the students tell what they did.

3. REINFORCE HOW ELECTRICITY IMPACTS STUDENTS' LIVES

Have students brainstorm all of the different items that use electricity (that use either batteries or generated electricity). This list should be long! **Set a goal that students find at least 25 (or more) appliances and other household items that use electricity.**

Project Wrap-Up & Enrichment

Students will now have an idea of how electricity was "discovered"—or at least how people figured out how to make it useful in everyday life. They will also have a basic understanding of how electricity works and a comprehensive list of the various ways we use electricity today. From all of this knowledge, students will have enough information to do the following: give a short history of electricity; describe how it works and how people learned about it; and discuss how life would be different if people had not discovered how to use electricity. The responses to these challenges could be completed in an essay entitled "How electricity changed the world."

Students might decide to be more creative. Some more creative approaches include a story written from electricity's point of view, a comic book describing how electricity works or a personal story of a day in the life of a student without electricity.

Tips for Increasing the Difficulty of the Project:

Students could perform activities with very little help and could use much more trial-and-error to complete activities. Have some students label their diagrams and use the vocabulary correctly. See the *Note* under Project Activity #2 for additional advanced, optional activities that require greater knowledge of how electricity works. Appendix F contains a more advanced scientific experiment (which requires adult supervision). This activity could also be used as part of the students' end-of-curriculum presentation.

Tips for Decreasing the Difficulty of the Project:

Lead the whole class through Project Activity #2 together. Either explain each step before students attempt it, or perform each step and explain what happens. The latter requires only one science kit for the whole class. Younger students' drawings will be less sophisticated, and there is no need to dwell on vocabulary. Most students are so eager to get hands-on experience in science—with this activity, all students can experience success.

UNDERSTANDING CYCLES

Project Overview:
This project will look at the idea of change in a new light. Instead of simply observing what is new and different about something undergoing the process of change, students will note how certain changes in life and nature are cyclical. Many examples of cycles will be introduced. The next lesson, "Turning Ice to Steam," focuses on the water cycle (allowing students to conduct experiments and review materials that demonstrate how water changes from solid to liquid to gas and returns again in a continuous pattern) and reinforces "Understanding Cycles."

Student Goals

- Students will understand the basic idea behind cycles and cyclical change: where changes occur in an observable pattern that returns the item in question to its original state.
- Students will conduct experiments and make observations that relate to various natural cycles.
- Students will observe a cycle diagram and describe each individual step in the process.
- Students will learn about the stages of the water cycle and apply that knowledge to a demonstration model that replicates the patterns noted in experiments and observations.

Student Motivation/Mini-Lesson:

As a basic introduction to the idea of cycles and the vocabulary of this natural process, ask students where they have seen the word "cycle." Students should be encouraged to think where the word appears in other, longer words that they use everyday. The obvious tie-ins will include bicycle, tricycle, motorcycle, unicycle, etc. From this list, break down the words to observe that "cycle" clearly has something to do with wheels and the special properties they have. The next step in the discussion will be to have students consider what is special about wheels, what makes them roll. Once students recognize that wheels are circles, you can introduce the idea of cycles.

Draw a circle with a piece of yarn in the middle of the room. Students will then be asked to walk along the piece of string. What do students notice about "walking around in circles?" Students will note how they always end up back where they started, and they always cover the same ground along the way. This is the idea behind a cycle: that events in a cycle must follow a certain pattern that eventually returns to the place where the cycle originally began. Help students understand that this is the most useful aspect of a circle and a wheel. Demonstrate this idea using a wheel with a visible marking. Roll the wheel and note how the motion is such that even though the wheel moves forward the mark on the wheel eventually ends up in the same place as when it started.

Materials Needed

- String or yarn
- *The Magic School Bus*
- Large sheets of drawing paper
- A small cup and a clear plastic or glass bowl

Project Activities

1. READ *THE MAGIC SCHOOL BUS*

Have students read *The Magic School Bus* either by themselves, in groups or as a class. As students read the book, give them a purpose for reading: they should consider the trip that the students in the book take from beginning to end. Once they become water, how many different things do they become? (List each one.) How many times do they become the same thing? How are they able to return back to these things? Instruct students to draw a one-page summary of the different phases of their trip.

2. REINFORCE THE MAGIC SCHOOL BUS WITH A HANDS-ON ACTIVITY

Have students conduct an experiment to replicate the basic principles of the water cycle. Instruct students to **fill a small cup with water and mark the level of the water** in the cup. They should then **cover the cup with a glass or clear plastic bowl and put the cup in direct sunlight**, either outside or in a window that gets fairly steady light (if neither is available, put cups close to a powerful light). **Have students return to their experiment after about one hour.** They should check their experiment and observe any changes. **What happened? Has the water level in the cup changed? How does the bowl look? What is the air like inside the bowl?** Go over these observations with students. Using *The Magic School Bus* as a guide, students should discuss what processes occur in the bowl that are part of the water cycle. Students should consider how what happened in the bowl is similar to what happens in nature (i.e. what does the cup represent? the light? the mist?). **Students should diagram the water cycle**, using the book as a resource as well as the observations from their experiment.

Note: Another possibility is to begin the experiment first and read *The Magic School Bus* after students have put their cups of water in the sun. Once the book is finished, students can come back to the experiment. Because this experiment may take a while, teachers should look at the *Note* in the Project Overview of "Turning Ice to Steam" for what to do during this waiting period.

3. INCORPORATE "CHANGING SEASONS"

Have students think back to their adopted tree ("Changing Seasons"). **Students should consider the changes that occurred to their tree over the past few weeks.** Based on their experiences, what do they predict the tree will look like in December? April? **Have students complete their predictions of the tree for each season (in words or pictures).** Get students thinking about whether the seasons are a cycle.

Note: As mentioned in the tree exercise, students will go back and visit their tree in the winter and spring and study it. They will then be able to confirm the predictions they make in this project.

Project Wrap-Up & Enrichment

Students will document and diagram a cycle not yet covered in this project. Ask students to think about different events in people's lives and those in nature. Have them take special note of any group of events that happen over and over again where something changes only to return to its original state or condition. Examples include: the sun rising and setting; the phases of the moon; laundry; recycling; etc. Other, more complicated examples include the life cycle and the food cycle. Both of these cycles are more difficult because the object in question (a human being) does not return to its original state (a baby), but rather produces something that begins the same journey of life all over again.

Tips for Increasing the Difficulty of the Project:

Introduce students to the life and water cycle activities suggested by the Department of Interior (see Appendix G). These activities include learning about the life cycle of salmon and playing a game about the importance of conserving water. Have students diagram the life cycle (or the food cycle) where events move in a definite pattern but certain objects in the cycle do not continue on indefinitely.

Tips for Decreasing the Difficulty of the Project:

Conduct the water experiment as a group. Speed the process up by adding heat to the water from another source (i.e. a hot plate). Rather than reading *The Magic School Bus*, students could read about the cycle in a non-narrative expository piece found in a children's encyclopedia. This would provide a more straight forward description of each stage and the changes that occur. Another substitute for the book would be to rent Disney's *The Lion King* video. The song "Circle of Life" is all about how the king grows old and has a son and passes down his legacy to his son. The song also covers the idea of other cycles in nature.

TURNING ICE TO STEAM:

An Extension of Cycles

Project Overview:
Students will observe water in its three states of matter and observe the properties of each. In addition, students will document the steps necessary to change water from one state of matter to another. Students will conclude the activity by applying this concept back to cycles in general and looking for other items that change their state in nature.

Note: This project is a short enrichment activity designed to reinforce some of the learning students will do regarding cycles, particularly water cycles. This project can provide an activity for students while they wait for their evaporation experiment to work in "Understanding Cycles." This project also requires a waiting period where students could go back and complete activities in the "Understanding Cycles" project. Prepare "Turning Ice to Steam" ahead of time by placing a number of filled Tupperware containers into the freezer for student evaluation.

Student Goals

- Students will learn about the three states of matter: solid, liquid and gas.
- Students will observe water in all three of these states and make inferences about each.
- Students will learn that temperature is the primary change agent in converting matter from one state to another and will apply this knowledge to the ideas introduced earlier in the project, especially with respect to the water cycle.
- Students will make connections to other materials that undergo similar changes in nature.

Student Motivation/Mini-Lesson:

Ask students to give their impressions of ice, snow, water and clouds. Have students try to free-associate as many things as they can with each term. These responses could be things as diverse as skiing, swimming, rain, Christmas, summer and April showers. Once students have completed this list, inform them that two-thirds of the earth's surface is covered by water (a drawing of this fraction might prove helpful). Since water is such a big part of the earth, it is important to know how water can affect the planet and the people on it. Tell students that the upcoming activities will give them a better understanding of how water works in nature and why it is such a powerful force.

Materials Needed

- Teakettle and hot plate (optional but preferred)
  Note: Otherwise, the materials used in the earlier water cycle experiment—a glass bowl, a high powered lamp or sunlight—will do.
- Small, plastic Tupperware containers filled with water
- Freezer
- Thermometer

Project Activities

1. INTRODUCE THE TERMS "SOLID," "LIQUID" AND "GAS"

Instruct students to look in an encyclopedia or dictionary for the definitions of "solid," "liquid" and "gas." Have them write these definitions down.

2. HAVE STUDENTS OBSERVE A SOLID CHANGING INTO A LIQUID

Students will start off with a Tupperware container filled with ice. **Have students observe as many properties of the ice as they can.** For this step, it may be helpful to have them make a chart of the five senses. For certain categories, such as touch, they will have a great deal more information than they will for sounds. For older students, add other categories that record physical properties such as temperature and weight. **Let students observe what happens to the ice as it is left to sit in the classroom.** Students should note in their science journals or notebooks what is happening to the ice in pictures and words. **Have students walk away and return after about an hour to see the condition of their ice, which will now be water.** They should once again fill in their observation charts, taking note of as many characteristics as possible.

3. HAVE STUDENTS OBSERVE A LIQUID CHANGING INTO A GAS

Instruct students to take one or more of their containers and pour the water into a teakettle. Once the kettle is filled, the hot plate will be turned on and students will need to wait once again. When the kettle begins to whistle, students should fill out as many observations on the steam coming out of the kettle as possible.

Note: Students should clearly be careful with the steam. They should not try to taste or smell it coming out of the kettle. They may quickly pass their hand over the steam and observe what residue is left on their hands.

4. REINFORCE THE NEW TERMS: "SOLID," "LIQUID" AND "GAS"

Have students try to match each state of water (ice, water and steam) with a state of matter (solid, liquid and gas).

Project Wrap-Up & Enrichment

Students will write up their observations about the changing nature of water and in doing so describe the different properties of a solid, a liquid and a gas. Students should also consider what they believe is the key factor in changing the water from a solid to a liquid and then to a gas. Suggest that they offer a theory as to why this change happens.

Students should make sure that in their diagram of the water cycle that they completed for the "Understanding Cycles" project that they documented water as a solid as well as a liquid and a gas. They should also create a diagram of another example of matter changing from one state to another in nature. The best example for students who are stuck would be to consider how a volcano works.

Tips for Increasing the Difficulty of the Project:

Have students do more careful, scientific observations of each stage of matter. Students could attempt to measure the temperature, weight and volume of ice, water and steam. Finding some of these qualities for steam might prove difficult, but students could try to brainstorm ways to estimate these measurements. For example, they could try and collect a certain amount of steam and measure how much water was missing from the teakettle.

Tips for Decreasing the Difficulty of the Project:

The terms "solid," "liquid" and "gas" could be introduced during the Student Motivation/Mini-Lesson, and students could try to match them with the different states of water. Students could draw pictures of each state of water and what the weather would look like when water was in that state rather than writing up the findings in a five senses charts. Students do not have to find another example of changing states of matter in nature.

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TIME MARCHES ON:

Keeping Track of Changes Over Time

Project Overview:

Students will focus on telling time, using calendars and creating timelines. The theme of change is directly related to this concept since all changes occur over a period of time. Students will conduct activities that will enable them to understand how the entire world measures time and keeps track of changes. Once students get a better understanding of what time is and how it is measured, they will be able to study changes around them more effectively. Many of these ideas will be explored further in later projects based in the past or the future (any "If I Lived…" lesson).

Student Goals

- Students will understand how and why people measure time.
- Students will understand the properties of seconds, minutes, hours, weeks, months and years.
- Students will gain numeracy skills related to this project and will practice telling time and adding and subtracting hours (older students will handle questions involving minutes and AM/PM), days and years.
- Students will construct and understand sequential timelines.

Student Motivation/Mini-Lesson:

Ask students to write down their ages and birthdays. Help the students work backwards from the current year to remember the year in which they were born. For example, students will need to subtract 6 years from 1998 to find that their birth-year is 1992. They will then put their birthday alongside that to come up with their actual birth date. For older students this activity can be made more interesting by asking students to determine how many months or days old they are.

Armed with their age and birth date, students will now be introduced to the concept of a timeline. Demonstrate on a long strip of paper (a sentence strip will do nicely) the idea of a timeline using their own life as an example. They will label the left end of the timeline with their birth date, then measure out a sufficient number of year or month increments along the timeline to correspond with their age. Stress the idea of labeling important milestones and dates along the course of the timeline. For example, label events such as his or her first steps or graduation from school. Ask students to create their own personal timelines, including at least five significant events.

Stress that timelines are an extremely helpful way to put events in order so that we can see the different things that were happening at certain times in history. Mention that the group will continue to use timelines in other projects during the coming months. End with a discussion about time and why and how we keep track of it. Ask students to consider why people started keeping time and what would happen if we stopped.

The project itself will have students create their own calendars, timelines and clocks. In each phase of the project, students will learn how to record and convert different measures of time.

Materials Needed

- Sentence strip paper for timelines
- Markers, paper plates, fasteners, construction paper and glue
- Regular clocks, digital clocks and stopwatches
- Blank white pages or blank calendar printouts

Note: See Appendix H—Calendar and Day Planner Black Line Masters.

Project Activities

1. MAKE A TIMELINE

Help students begin to construct a timeline that goes back 2,000 years. This timeline will start in the year 0 B.C. and move up until the present. Tell students that they will be using this timeline for future projects so they should take care to do a good job. In addition, tell them that they may be adding to the timeline later so they should not make it too large. As a general rule of thumb, allow no more than two inches for every century. Many students may need help in this process and it may make sense to have previously filled out the starting and ending points on the timeline.

2. MAKE A CALENDAR

Have students make a calendar (using the calendar blank line masters from Appendix H). They should use a real calendar as a model, paying close attention to when months begin and end. Show students how calendars sometimes split a date in order to make it fit if the calendar runs out of room. Each calendar page will have room for decorations and the name of the month. Students who have completed the seasons project may already have some seasonal drawings or pictures that they could use to decorate their calendars. **Once the dates and months are filled in, have students fill in special holidays and personal special days.**

3. MAKE A DAILY PLANNER

Have students create a daily planner (again from a blank template included in Appendix H) that charts all 24 hours in a given day. **Instruct students to fill in their planner with activities that they are planning to complete the next day.** These should include: waking up; attending school; etc. **Tell students to bring their daily planner with them wherever they go the following day so that they can fill in exactly what they were doing all day**. Have students compare the results of what they predicted and what they actually did.

4. MAKE CLOCKS

Have students build four individual clocks with paper plates, paper fasteners and pieces of construction paper. From these clocks, **have students complete a set of pictures and descriptions of what it looks like outside at six hour intervals** starting at midnight (let the students figure out the other times). The clocks' setting should correspond to the time of day they are drawing and describing. Encourage students to pick a location that will show a great deal of change throughout the day. Each description should explain what is going on in the picture and how it is different or the same as the other three pictures.

5. TIME VARIOUS EVENTS AND ACTIVITIES

Have students use a stopwatch to time how long it takes a partner to walk, run, tie their shoes, count, go down or up stairs (some of these activities will need to be conducted outside) **and chart their results.** Students can compare and chart the different times and/or distances other students had. Students should write down if their times were faster, slower or the same as other students' times.

Project Wrap-Up & Enrichment

Students should wrap up their project with an essay or poem about time. What did they learn about time? Why do they think people measure time? What happens over time? Students should also enter their calendar, clock and daily planner into their portfolio of work.

Have students who would like to present their work on this project as their end-of-curriculum presentation produce polished examples of each time activity. Students might want to include a short description of what they made, what it measures and how it is useful to people.

Tips for Increasing the Difficulty of the Project:

Daily Planner: Have students calculate what percentage or fraction of the day they spend sleeping, in school, etc., or add up the hours to find the total time spent on an activity per month or year.

Clock Making: Skip the clock construction and have them compile an hourly log of what is happening in a busy part of the surrounding neighborhood.

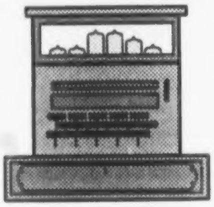
Timing Activities: Have students figure out how much time they spend doing certain activities in a week, month or year (or how long it would take them to run or walk one mile).

Tips for Decreasing the Difficulty of the Project:

Timelines: Make blank templates that have space for each century. Students would just need to fill in the years.

Calendars: Fill in the starting and ending dates for each month.

Timing Activities: Operate the stopwatch and have the class do the timing activities together. Inform students of their times.



MAKING CHANGE:
Turning Money into Stuff

Project Overview:
Students will conduct a series of exercises designed to familiarize them with using cash to purchase items. Students will review the basic components of currency and review the value of different coins and bills. Students will then perform a number of "brain-teaser" activities that will allow them to increase their facility with money and the mathematical operations needed to purchase items with cash. Once students have a general understanding of how to combine different denominations to make change, they will conduct a real world application by creating a student-run candy store.

Student Goals

- Students will learn to solve problems in a systematic way, ordering operations and charting the results.
- Students will determine which product they would like to buy and find out the price of that product.
- Students will determine how much money they have in hand and if they have enough money for the desired item. Students will count out the exact change or determine how much change they are due.

Student Motivation/Mini-Lesson:

Begin with a general overview of money and the various denominations of coins and bills. Remind students that as they continue to grow up and take responsibility for their lives, they will need to be able to handle money. Introduce a "brain teaser" where students predict how many different combinations of coins can be used to produce one fixed amount. For the first example, use five pennies, two nickels and one dime. Students will predict how many combinations will produce 10 cents. After students make their predictions, demonstrate the "guess and check" method. The "guess and check" method has four components: (1) make a plan; (2) create a chart or table: (3) eliminate possibilities; (4) look for a pattern. In this case, step one involves using the smallest coins first and going up from there. Next, students can build a chart like this:

Coins Used	Total	Amount Needed	Check
1 penny	1¢	10¢	No
2 pennies	2¢	10¢	No
Etc.		10¢	No
1 penny + 1 nickel	6¢	10¢	No
Etc.		10¢	No
5 pennies + 1 nickel	10¢	10¢	Yes

Point out how many different combinations can be used to produce the same result. Show students that they can predict the number of combinations by looking at how many coins they have and the total amount those coins need to add up to. With only a few coins there will be only a few possibilities.

Conclude the Student Motivation/Mini-Lesson with a brief discussion of making change for someone. Compare the use of the word change in other fields, such as science, and the way change is used here. The reason people say "change" is because they are changing their money from one form to another. Use an example: "When you buy a soda for 50 cents with a one dollar bill, you *change* your money into one can of soda and two quarters." Tell students that they are going to open a store where they will have to make change quickly.

Materials Needed

- Coins for each group: 25 pennies; 10 nickels; 10 dimes; and 10 quarters
  Note: See Appendix I for printouts of coins that can be copied.
- 45 pieces of candy (fifteen pieces of three different types)
- Play money and cash register sheet (see Appendix I)
- Activity ideas for learning about money from Bank Street College of Education (see Appendix I)

Project Activities

1. PRACTICE HANDLING MONEY

Using pennies, nickels and dimes, challenge students to find how many different combinations can be used to make 25 cents. Make a chart with pennies, nickels, dimes and "total" as column headings. **Challenge students to find how many different combinations (where at least one of each coin is used) can make 50 cents.** Have students make predictions before starting. Compare predictions to findings. **Repeat using seventeen coins, including at least one nickel, dime and quarter, to make $2.25. Repeat using the same seventeen coins to make $2.25 where there are four more dimes than nickels**

Note: There are twelve ways to obtain 25 cents. Step 2 introduces two conditions—at least one of each coin and a total of 50 cents—and has only two combinations. Step 3 introduces three conditions—at least one of each coin, seventeen coins and a total of $2.25—and has only three combinations. Step 4 introduces four conditions—at least one of each coin, seventeen coins, a total of $2.25 and a relationship of one variable (dimes) to another (nickels)—and there is only one combination.

2. PLAY THE "SPEND OR SAVE!" GAME (optional)

Have students **play the "Spend or Save!" Game**, featured in Appendix I. The rules of this game are a bit simpler than Project Activity #3. The game provides a chance to reinforce the basic notions of how money works as well as introduces the ideas of saving and spending.

3. OPEN A CANDY STORE

Let students open a candy store to use their new skills in a "real world" context. Break students into groups. **Give each group five pieces of three different kinds of candy**, for a total of 15 pieces. Students can use construction paper to help design store items. Give students a cash register sheet (outlining the number of items purchased, their cost, the total amount charged, the amount tendered and the amount of change received—found in Appendix I). Determine each different item of candy's value ahead of time. **Give each group enough money in bills to buy the inventory of another store in an assortment of bills and coins.** They may not purchase any items from their own store. Remind students not to go out and spend all their money because they will need to have some cash on hand to make change for other students visiting their store. **Have students bring their change to each other's "stores" where they will count their money and decide what to buy.** The student-store clerk will then add together the student-customer's charges and give them change. The clerk will record the sale on their cash register sheet.

Note: Suggested prices would be 25¢, 50¢ and 75¢. These amounts can be adjusted depending on the level of the students.

An option is to set up additional rules and objectives for the game. Ask students to look at the inventory of the store before they open for business and calculate how much money they will have after they sell all of their candy. They can then check this amount against the total collected to make sure they made no mistakes. Students could be told what each item cost to buy from the candy maker and they could set their own prices where they would try to make a profit. The ideas of profit and competition would need to be introduced.

Student groups that run out of change could be permitted to go to other stores and ask for change for bills they have collected.

Project Wrap-Up & Enrichment

After the students have progressed at least through counting quarters, take them on a field trip to practice these skills in the community. If they can bring a small amount of money, they can actually buy something in a store. If they cannot bring money, they can window shop and compare prices. This activity is good just before winter break as it affords the students a chance to shop for gifts without the family members around who will be receiving those gifts.

Tips for Increasing the Difficulty of the Project:

The elements of Project Activity #1 are listed in order of mathematical complexity. Students with more advanced number skills should be grouped together and asked to do the more difficult exercises. Project Activity #2 may be skipped. As mentioned in the *Note* in Project Activity #3, the prices of candy at the store can be manipulated to produce more complex math operations. Include the idea of sales tax as either a percentage of the total or a set amount for each piece of candy.

Tips for Decreasing the Difficulty of the Project:

If students struggle with any of the "brain-teaser" activities, simply give students a few coins and instruct them to come up with just one combination that produces a set result (i.e. three quarters, three dimes and three nickels to make one dollar). Substitute the "Spend or Save!" Game for Project Activity #3. It requires only a basic facility with money. Or make each candy the equivalent of one coin: a gumball would cost one penny; a gummy bear one nickel; and a candy bar one dime. Students could simply exchange coins for candy.

IF I LIVED 100 YEARS AGO:

Immigrants Arrive in New York City

Project Overview:

The project will ask students to think about how their lives would be different if they had lived 100 years ago. At the conclusion of the project, students will have discovered the tremendous amount of change that has happened in a relatively short time. Students will use a number of different graphic organizers to compare and contrast life near the end of the last two centuries. They will also be able to evaluate what they would have liked and disliked about growing up in 1899. (This lesson can be applied to other cities.)

Note: The four projects entitled "If I Lived…" all share the common theme of historical, cultural and environmental changes that occur over time. They build off the ideas of time and change that were introduced in "Time Marches On" and use the timeline created in that project. Depending on student and teacher interest, it may make sense to do only one or two of these inter-related projects. If more than one of these projects are selected, do them in the order they appear. In that way students can begin to learn the basics of doing historical research in a progressive fashion that begins closest to their experience and expands from there. These projects will also require that students utilize a number of different texts, videos and class trips to local history museums to learn more about how the world was in the recent and distant past. The children's book, *Felix Travels Back in Time* by Annette Langen and Constanza Droop, might be an excellent kick-off to this series of projects. The book, through letters and pictures, tells of the travels of a stuffed animal experiencing the cultures of many different nations and eras.

Student Goals

- Students, using a number of historical references, will gain a perspective on life in New York City in the not-so-distant past. Students will come to appreciate how much has changed in just 100 years as well as how some things have remained the same.

- Students will use graphic organizers to chart research and critically analyze that research by contemplating the pros and cons of living in 1899.

- Students will read fictional and non-fictional accounts of earlier times, including primary source materials such as diaries, letters, memoirs and biographies.

- Students will gain an appreciation of the passage of time through the continued use of their timelines.

Student Motivation/Mini-Lesson:

Prompt students to think about all aspects of life in 1999. Areas for students to think about include: leisure activities; transportation; news; communication; homes; medicine; food; arts; government; education; business; human relations; and discrimination.

Once students have compiled a detailed listing of current living conditions for young people, start a discussion of how much has changed in just 100 years. Point out a few examples to give students a sense of how drastically life has changed since 1899 (no cars, no phones, etc.). From this discussion, introduce a Then and Now Chart (see the Introduction's Explanation of Common Terms). The organizer would look as follows:

Activity	Now - 1999	Then - 1899
Leisure Activities	Nintendo, Movies, television	
Transportation	Cars, Subways, Buses	
Communication	Phone, Mail, E-Mail	

Point out that the main focus of this project will be to fill in the "Then" side of the chart. Using a variety of different sources, students will attempt to locate information that will help them come to a better understanding of life 100 years ago. It may be helpful to demonstrate Project Activity #1 so that students begin to see the skills necessary to conduct research on a topic.

Materials Needed

- *If Your Name Was Changed at Ellis Island*, Scholastic Book
- *New York Then and Now: 83 Manhattan Sites Photographed in the Past and in the Present* by Edward Watson
- Suggested readings: *Frederick Douglas*; *Statue of Liberty* book; *The Long Way to a New Land, My New York*; *Colliers Encyclopedia & New Book of Knowledge*
- Video from the PBS Series on Immigration and Ellis Island.

Note: See Appendix C for suggested Internet resources on New York City history.

Project Activities

1. RESEARCH NEW YORK CITY 100 YEARS AGO AS A GROUP

Ask students what they think life was like both in New York City and the United States 100 years ago. Compile the results in an idea web and possibly have students add an additional column to their Then and Now Chart entitled "My Predictions." **Read *If Your Name Was Changed at Ellis Island* to the group. Prior to reading the book, set a purpose for reading based on the completion of the Then and Now Charts.** Students will look and listen for clues in the book about how people lived and take notes if possible. **Watch a video from the PBS series on Ellis Island as a group** and note the different aspects of cultural life that are displayed in the video. **Have students review the book *New York Then and Now*,** a historical photo essay of how New York City looked 100 years ago and how it looks today. Instruct students to look for differences in clothing, transportation, buildings and anything else that seems to have changed over time.

2. LET STUDENTS CONDUCT RESEARCH INDEPENDENTLY

Present students with appropriate research material, including (but not limited to) *Frederick Douglas*, *Statue of Liberty*, *The Long Way to a New Land*, *My New York* and *Colliers Encyclopedia & New Book of Knowledge*. **Students should now be ready to conduct some directed research on their own.**

3. REINFORCE ACTIVITIES AND RESEARCH WITH A FIELD TRIP

A field trip, if possible, to a local museum or historical site would provide a wealth of information on life 100 years ago. Contact the museum ahead of time to give some background on the project idea so that certain artifacts dealing with the 1890's and young people could be highlighted.

Project Wrap-Up & Enrichment

Once students have completed their Then and Now Chart, they should take the information they gathered on life in 1899 and add it to the timeline they completed in "Time Marches On." Students should also include their thoughts and observations on the project in their writer's notebook. These thoughts and reflections could be brought into a more formal essay where students discuss the pros and cons of growing up today versus one hundred years ago.

For students who have a particular interest in this project, they may wish to choose an enrichment activity as their end-of-curriculum presentation. Certain enrichment activities include: creating a newspaper from one hundred years ago; writing a story of a day in the life of a young person in 1899; or expanding their research to include life in the United States as whole in 1899. See Appendix J for a more detailed list of enrichment activities.

Tips for Increasing the Difficulty of the Project:

Have some students do the group activities, filling in the "Predictions" section of their Then and Now Chart and reading the book *If Your Name Was Changed at Ellis Island,* independently. Also, instruct students to conduct independent research during museum visits and write up a typical day in the life of a young person in 1899 and 1999 based on their discoveries.

Tips for Decreasing the Difficulty of the Project:

Create a blank Then and Now Chart that lists the various categories that students will be comparing. During the reading of *If Your Name Was Changed at Ellis Island* and while looking through *New York Then and Now*, prompt students to fill in the corresponding sections of their Then and Now Chart. Make a pre-trip visit to the museum(s) and list the information students will need to complete their chart in the form of a scavenger hunt. For example, "You will find a good example of what people used for transportation in 1899 on the 2nd floor."

IF I LIVED 1,000 YEARS AGO:

The Middle Ages

Project Overview:
This project is the second in a series having to do with historic, cultural and environmental changes over long periods of time. This project will be very similar in scope and sequence to the initial project, “If I Lived 100 Years Ago.” For this project, students will focus less on the idea of what life would be like in American cities and more on what the basic facts of life were like for people who lived in this era. While most of the information available tends to have a European focus, the group may choose to explore Native American as well as African and Asian experiences during this time.

Student Goals

- Students will look at a number of historical references in order to gain a perspective on life in a very different cultural environment.
  Note: While an in-depth study of the material might prove somewhat difficult, the basic idea that life was extremely different and difficult in earlier times can be effectively conveyed.
- Students will use graphic organizers to chart research and critically analyze that research by contemplating the pros and cons of living 1,000 years ago.
- Students will read myths, folktales and legends to better understand the culture of the time.
- Students will gain an appreciation of the passage of time through the continued use of their timelines.

Student Motivation/Mini-Lesson:

Students will review the ideas about their current living environments generated in "If I Lived 100 Years Ago" to prepare a new Then and Now Chart. (For students who did not complete this exercise already, see the Student Motivation/Mini-Lesson in "If I Lived 100 Years Ago".)

Introduce the idea of how much larger 1,000 is than 100. Using students' timelines, demonstrate how things like the United States were not even "discovered" until 500 years ago. Ask students if they have any thoughts on what life might have been like in 999. Go over the fact that as history goes back further and further in time, it becomes more difficult to know exactly what life was like. Exploration of this world, however, is possible through stories and historical studies.

Read the introductory section of *Medieval Life* and *Robin Hood*. Ask students to think about how these two readings relate to each other. Ask students what they know about dragons, knights and castles. Create a K-W-L Chart that lists what students already know (K) about the topic, what they want (W) to know and what they learned (L).

Introduce myths and legends. Tell students that part of the job they will have as historians in this project will be to try and figure out what parts of the stories they read really happened and which parts were made-up myths or legends from a long time ago.

Note: For a detailed explanation of K-W-L Charts, see the Explanation of Common Terms section of the Introduction.

Materials Needed

- Appendix K: Chivalry Kidzone Web Page Print-Out
- *King Stork* by Howard Pyle
- *Robin Hood* by Margaret Early (optional: *William Tell* and *Romeo and Juliet*, also by Margaret Early)
- *Medieval Life*—Eyewitness Books
- *Merlin & The Dragons* by Jane Yolen (optional)

Project Activities

1. INTRODUCE KNIGHTS, CASTLES AND DRAGONS

Have students draw scenes from the stories they read in the Student Motivation/Mini-Lesson. Tell students to imagine in their mind what they think knights, castles and dragons look like. Once students complete this task, they can look at the illustrations in the books and other source materials to see how close their original drawings were to those in the books and other resources.

2. INTRODUCE MEDIEVAL SOCIETY

Ask students to look at the Chivalry Kidzone web page (Appendix K). Help students read through the web page and learn information about nobles and how they ruled society. **Students may want to add new categories, such as medieval government, education and households to their K-W-L Charts.**

Note: It may be confusing to have a K-W-L Chart and a Then and Now Chart. For this reason, it may make sense not to use the Then and Now Chart until the very end of the project, at which point students can copy the information from the "L" section of their K-W-L Chart to the "Then" section in their Then and Now Chart.

3. LET STUDENTS CONDUCT RESEARCH INDEPENDENTLY

Have students go through the remainder of the resources for this project. Make sure they are careful to record any new information they discover on the lives of medieval people and transcribe that information onto their Then and Now Charts.

Project Wrap-Up & Enrichment

Remind students that while most of the information they record actually happened, some of it is made up (through stories getting passed down from generation to generation, etc.). Part of their job as historians is to look at all of the information and decide which is real and which is made-up. As in the previous project, students will be responsible for writing a critical piece on what it would have been like to live in the Middle Ages. This report should include an analysis of both the pros and cons of life back then versus in the present day. The difference in this report will be the attention to determining whether or not certain things actually existed or happened.

Students who have a special interest in this topic may wish to focus their end-of-curriculum presentation on medieval times. Students might want to make a chart showing the steps necessary for knighthood, research famous figures of that time, make a poster that lists the code of chivalry, imagine a day in the life of a squire, king or child during medieval times or build a construction paper suit of armor.

Tips for Increasing the Difficulty of the Project:

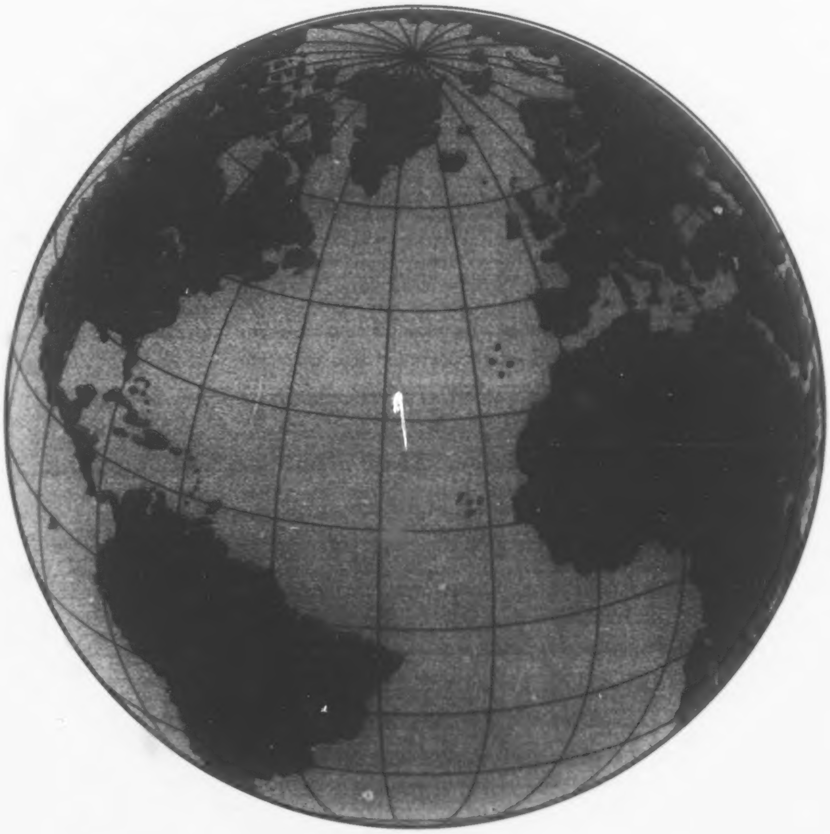
Have some students do the group activities, filling in the "Predictions" section of their Then and Now Chart, reading *Medieval Live* and one of the other suggested titles and conducting research independently. Have some students write up a typical day in the life of a young person in 999 and 1999 based on their discoveries.

Tips for Decreasing the Difficulty of the Project:

Create a blank Then and Now Chart that lists the various categories that students will be comparing. During the reading of *Medieval Life* and *Robin Hood*, prompt students to fill in the corresponding sections of their Then and Now Chart.

Instead of having the students transcribe information from their K-W-L Chart to their Then and Now Chart, make students create only one of the charts. Since the Then and Now Chart will most likely have been introduced to the students in a preceding project, it might be better to eliminate the K-W-L Chart or complete it as a large group during the Student Motivation/Mini-Lesson.

SOCIAL STUDIES



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IF I LIVED 1,000,000 YEARS AGO: When Dinosaurs Ruled the Earth

Project Overview:
This project is the third in the "If I Lived…" series, having to do with historic, cultural and environmental changes over long periods of time. Unlike the first two projects, "If I Lived 1,000,000 Years Ago" will focus less on the social and cultural aspects of living in a certain time and more on the natural and environmental conditions existing at that time. Students will begin the project by gaining an appreciation for how long 1,000,000 years is in human terms. From this vantage point, students will utilize texts, pictures, videos and museum trips to learn the basic facts about dinosaurs—different kinds, living habits and history on earth.

Student Goals

- Students will use graphic organizers to chart research and critically analyze that research by contemplating the pros and cons of living 1,000,000 years ago, including the reality of living on an earth with no human beings.
- Students will read science-based, non-fiction materials for information on the presumed lives and habitats of dinosaurs and other creatures living during this time.
- Students will learn about the difficulty of studying things which existed before people recorded history.
- Students will gain an appreciation of very large numbers and the age of the earth through scientific and archeological resources and timelines. These exercises will continue the use of the student-created timelines.

Student Motivation/Mini-Lesson:

Students will most likely know a fair amount about dinosaurs from movies and television. Brainstorm about dinosaurs with students in the K-W-L format (introduced in "If I Lived 1,000 Years Ago") or simply generate an idea web on dinosaurs. In either case, create a number of topics that students will have to investigate during the project (i.e. types of dinosaurs, eating habits, size, etc.). Introduce two important concepts central to this project: the concept of "pre-historic" times and how scientists must discover clues rather than look through photographs or documents; and the concept of very large numbers, such as one hundred million.

As an introduction to the first topic, it might be helpful to have students think about how we can know about something if no one was there to see it or write about it. An example of this process might be solving a riddle or a crime from different clues that were lying around. The second topic can be done using the students' own timelines. Since the timelines students made cover 2,000 years – from 0 BC to the present, demonstrate that it would take 50,000 timelines like that to get back to the time of the dinosaurs.

Materials Needed

- Dinosaur stencils, stickers and figures
  Note: Available at the Natural History Museum in New York City or Barnes and Noble Booksellers. The Dinosaur Discovery Learning Kit (optional) is also available at Barnes and Noble Booksellers.
- Dinosaur Timeline (Appendix L)
- Construction paper, scissors, crayons and coloring books
- Encyclopedias
- Books on dinosaurs (at least one): *Illustrated Book of Dinosaurs* by David Lambert; *Dinosaurs and Pre-Historic Creatures* by Michael Teitelbaum; *The Great Dinosaur Atlas* by William Lindsay and *Dinosaurs and How They Lived* by Steve Parker
- *Drawing Dinosaurs*

Note: Field trips to local history museums, such as the American Museum of Natural History in New York City, can complement in-class material.

Project Activities

1. RESEARCH BASIC FACTS ON DINOSAURS

Have students begin by researching basic facts about dinosaurs. When did they exist? How long did they last? How did they live? Where did they live? **Instruct students to enter this information onto a K-W-L Chart on dinosaurs or an idea web.**

2. FOCUS RESEARCH AND LEARN MORE DETAILED INFORMATION

Once students have found out the basic information (the who, what, where, when and why) about dinosaurs, **have students "adopt" a dinosaur** (similar to as in "Changing Seasons"). The students will select a dinosaur figure they are especially fond of and will **then research detailed information on that dinosaur**. When finished, students should be able to put the dinosaur on the timeline (Appendix L) as well as fill in the basic categories established in the Student Motivation/Mini-Lesson.

3. WRITE A STORY ABOUT THE "ADOPTED" DINOSAUR

Tell students to write a story about their adopted dinosaur. The story should be illustrated with dinosaur pictures (from stencils and coloring books) and should describe the life of the adopted dinosaur. Students may want to write the story as a straight-forward research book or as a made-up tale that gives real details about their adopted dinosaur while telling a story. Students may even want to interview their dinosaur (pretending that he or she is on Oprah).

4. COMPLETE A THEN AND NOW CHART

Have students complete a Then and Now Chart similar to those used in the other "If I Lived…" lessons. In this instance, students should use the facts from their dinosaur story to compare their lives with those of dinosaurs, especially their adopted one. The chart might look something like this:

Activity	Now – 1999	Then – 100 Million BC	Then (my predictions)
Eating	Sandwiches, Pizza	Leaves, other dinosaurs	This column is optional
Homes	Apartments	Caves	
Family Life	Live with parent until 18	Live in groups	
Education	School K-12, College	No school for dinosaurs	

Project Wrap-Up & Enrichment

Have students write an "afterward" to their dinosaur book where they will compare their life to that of a dinosaur. They will need to decide which life is more fun and whether they would like to have been a dinosaur. Students may want to come back to their dinosaur book and use it as part of their end-of-curriculum presentation.

Let students with particular interest in the topic expand their dinosaur book to include many different kinds of dinosaurs. Students might also want to expand on the idea of "Then and Now" by adding sections in their dinosaur books where they travel back in time to visit their adopted dinosaur and the dinosaur comes to the present day to visit them.

Tips for Increasing the Difficulty of the Project:

Have some students do the group activities, filling in the "Then (my predictions)" section of their Then and Now Chart and reading any of the illustrated dinosaur books, independently. Instruct some students to conduct independent research during museum visits.

Tips for Decreasing the Difficulty of the Project:

Create a blank Then and Now Chart that lists the various categories that students will be comparing. During the reading of dinosaur books, prompt students to fill in the corresponding sections of their Then and Now Chart. Make a pre-trip visit to the museum(s) and list the information students will need to complete their chart in the form of a scavenger hunt. For example, "You will find a good example of what dinosaurs ate on the 3rd floor." Have students create only one of the charts. Since the Then and Now Chart will likely have been introduced to the students in a preceding lesson, it might be better to eliminate the K-W-L Chart or complete it as a large group during the Student Motivation/Mini-Lesson.

IF I LIVED 100 YEARS FROM NOW…

Project Overview:
This is the last lesson in the four-part series about changes in the world that occur over time. This project will ask students to make predictions about the future rather than conduct research about the past. Students will generate ideas about the future from their own imaginations, futuristic movies, television and science-fiction stories. Try to get students to look at new discoveries being made today that may have an impact on the future, such as the Internet and genetic cloning. At the culmination of the project, students will have generated their own personal vision of the future.

Student Goals

- Students will observe the constant state of change around them and understand that changes, like those they witnessed from the past, will continue in the future.
- Students will be introduced to the literary genre of science fiction and will use a variety of different sources, combining their imagination with actual developments in science and technology, to make predictions about the future.
- Students will learn the fundamental concept of prediction: taking the evidence at-hand and extrapolating from that evidence to form a logical conclusion.
- Students will create a futuristic society for which they will rely on their own imagination and ideas to tell a detailed story.

Student Motivation/Mini-Lesson:

Students will refer back to a previous "If I Lived..." project to discuss the tremendous amount of change that has occurred. Take the examples of transportation and communication and review the vast changes in both areas. Tell students that the goal of this project is to try and predict exactly what the changes of the next 100 years will be. Tell students there will be three ways to get ideas about the future: from their imagination; from other people's imaginations (through science fiction books, movies and television); and from recent technological advances such as the Internet.

Remind students that unlike the last few projects where they looked for facts on life in the past, in this project they will have to decide what goes in their chart for the future. In much the same way that scientists have to look for clues to find out about dinosaurs, students will need to look for clues that can help them predict the future. Go over the essentials of the prediction-making process. It may be helpful to remind students of the predictions they made during "Changing Weather" or use an example of making predictions in sports—for example: "Who will win the NBA championship next year? How do you know?" In both cases, a prediction is made from clues having to do with what has happened in similar circumstances in the past. Since no one knows what will happen in 100 years, students can only make educated guesses about the future based on what is happening today and what has happened over the last 100 years.

Materials Needed

Science fiction books: *FutureKids—The Internet Expedition* by Ron Harris and David Ullendorff; *Just A Dream* by Chris Van Allsburg; *June 29, 1999* by David Wiesner; *Science Fiction Stories* chosen by Edward Blishen; any book from the *X-Files*, *Star Wars*, *Star Trek: Next Generation* or *Star Trek: Deep Space Nine* series

Science fiction movies or television: *Star Wars; Back to the Future*

Resource materials: Encyclopedia information on cloning; Encyclopedia information on the Internet

Project Activities

1. CREATE A NOW AND WHEN CHART

Have students create a Now and When Chart to make predictions on life in the future. This chart will resemble the Then and Now Charts from earlier projects.

Activity	Now—1999	When? 100 Years From Now—2099
School	classrooms with 30 students and one teacher	Private computer lessons from a robot
Transportation	Cars, planes, trains, buses	Fly in personal sky-doo
Entertainment	Video games, movie theaters, and television	Virtual games where you play Michael Jordan in basketball

Note: The "When?" section will be completed by students later in the project.

2. EXPLORE THE FUTURE THROUGH BOOKS, VIDEOS AND THE INTERNET

Have students read one (or more) of the stories listed in the Materials Needed section and look for as many details on life in the future as they can find. Remind them that they do not need to put these ideas in their chart, but just consider them as options. **Have students watch one (or more) of the videos listed in the Materials Needed section and look for clues into the daily lives of people in the future.** Before they watch, ask students to consider questions such as: How do people get around? What do they eat? How do they entertain themselves? Who is in charge? **If possible, have students explore web sites or read print-outs of science-based sites.** These various sites will have information on technological changes in many different aspects of society. Stick to a limited number of topics so that students do not feel overwhelmed by the number of choices or the complexity of the ideas.

3. COMPLETE THE NOW AND WHEN CHARTS

Instruct students to fill in the "When" section of their Now and When Charts. Have students consider the many different visions of the future they have seen in books, movies and on the Internet. Again, using the essentials of the prediction process, students should look at recent changes in society and try to imagine how those changes will continue to evolve over time. Encourage students to try and make their predictions possible.

Project Wrap-Up & Enrichment

Have students write a day in the life of a student in the year 2099. They should take the great majority of their ideas from their completed Now and When Charts. Tell students to include illustrations that help depict what the new world looks like. In all cases, students should pay close attention to detail.

Let students who enjoy this exercise, and who would like to include this project as part of their end-of-curriculum presentation, write a richer, more detailed story on life in 2099. They may also want to construct props from their story that will represent new inventions or fashions. Students should be encouraged to read and view as many sources of science fiction as possible for inspiration.

Tips for Increasing the Difficulty of the Project:

The project as written is for fairly high levels of achievement. The focus on the process of making predictions can be further explored by asking students to assign reasons for each of their predictions. Add a third column in the Now and When Chart that asks students for evidence of their prediction. In this way, students will need to rely more on clues from the world of science and technology and less on their imagination.

Tips for Decreasing the Difficulty of the Project:

This project can be shifted a great deal by altering the focus away from the prediction process. Instead of encouraging students to make future predictions based on evidence, students could be encouraged to use the imaginary worlds of science fiction to create their own fanciful conceptions of the future. Introduce stories that paint elaborate visions of new worlds. The final product would be less a product of studying changes and making predictions and more an exercise in encouraging students to use their imaginations to design new realities.

HOW TO CHANGE A LAW

Project Overview:
Students will be exposed to the essentials of the democratic process and how laws change to meet people's needs. Through the use of various resources and different in-class activities, students will understand how people petition their lawmakers for change. From this initial stage to the final passage and implementation of a law, students will gain a general understanding of how politicians debate issues and vote on proposed changes to laws. The final activity of this project will be a real-world application where students either write to an elected official a letter or attempt to change a rule or guideline at their school or at the center.

Student Goals

- Students will understand the basics of the democratic process, such as: petitioning for change; debating different ideas and views; following majority rule; and respecting basic rights.
- Students will understand the basics of the American political process, such as: voting in elections; contacting representatives; introducing bills to the legislature; and passing or defeating bills.
- Students will apply these basic concepts to their own lives by attempting to change a law, rule or guideline that directly affects their lives.
- Students will evaluate the positive and negative aspects of using the democratic process to make the laws of a country. They will conduct a critical analysis of the process as they try to make it work.

Student Motivation/Mini-Lesson:

Ask students for their general impressions of American government. Encourage students to think about the various people they see on the news and name them. Brainstorm as many ideas as possible and do not worry if some of the information is not correct or is out of order. After the initial brainstorming session, focus the discussion with more pointed questions such as: Who is in charge of the U.S.A.? How did he or she get to be in charge? Who is in charge of our city? How did he or she get there? Can the person in charge make any law he or she wants? Who set up this whole process?

Take the answers students provide and begin to draw a basic map of the U.S. government. Without getting into too much detail, outline the basics of how the country began. Start with a discussion of how there was a king from England who made people do whatever he wanted and people got tired of it. They decided to build a government where all the people could have a voice in the decisions that got made in society.

Materials Needed

- SchoolHouse Rock Video "I'm Just a Bill"

  Note: See Appendix M for song lyrics.

- Newspaper article about school uniforms

  Note: If no actual article can be found, type up a mock newspaper article about instituting school uniforms.

- *The Kids Guide to Social Action*

Project Activities

1. WATCH "I'M JUST A BILL"

Have students watch the video "I'm Just a Bill." After the video is over, **ask students the following:** What do the local folks get upset about? Who do they call? What does he do about it? What happens when Bill reaches Congress? What are people arguing about? What happens if Bill gets a "Yes" vote in the House of Representatives? Where does Bill go if he passes the Senate? What is a veto? Is it easy to become a law?

2. MAP BILL'S JOURNEY

Instruct students to build a map that shows the journey of "Bill" from his first stages as an idea of a few citizens to his final status as a law. Encourage students who get stuck in this process to look at the *Kids Guide to Social Action* or encyclopedias that may contain information on the topic.

3. CHANGE A LAW

Tell students a short news story about the recent decision by the school board to have all students wear uniforms and that some people would like to make this a law for the whole country. Ask students if they think this is a good idea. **Take on the role of the students' Congressperson** (or have a student take on the role). The students will need to convince or lobby the Congressperson to write a law in favor of or in opposition to school uniforms. **Have each student write down his or her reasons for supporting or opposing school uniforms and share those reasons with the group.** Once the Congressperson has heard from everyone, **the Congressperson will decide which way to vote based on what more students want** (do not take a vote). Once the Congressperson decides, **all of the students will help write up a copy of the bill entitled "School Uniforms."** The bill should be fairly simple and state whether or not students will have to wear uniforms.

Once the bill is written, select one student to be President and have the other students be the members of Congress. The Congress will debate the bill again and take a vote. Assuming the bill passes again, tell students that it now goes to the Senate. The students will vote a second time. Once again, assuming it passes, tell the students that it now goes to the President to sign. That student will have to decide whether he or she wants to sign the bill or not.

Note: As the students' roles in this exercise will continually change, be sure to monitor students to ensure they understand where they are in the process.

Project Wrap-Up & Enrichment

Once Project Activity #3 is completed, discuss with the students what happened. How do the students who did not get what they want feel about the process? How do the students who did get what they want feel about the process? Was the process fair? What are the problems of majority rule? Remind students that in the real world they cannot vote, but Congress still passes laws about kids—is that fair? Why or why not? How can students still have an impact on the laws in this country?

Students should write down and discuss what they liked and did not like about the system and their thoughts on why it is so difficult to change or make a law.

Have students who are interested in the ideas raised in this project consider ideas about the *Bill of Rights*, certain rights people have that no law can take away. In the case of school uniforms, are students' rights being violated by being forced to wear uniforms?

Tips for Increasing the Difficulty of the Project:

Have some students compose a letter to an actual elected official about an issue of importance to them. Help students identify the most appropriate target for their letter based on the issue they select. Remind students that they need to argue that the law would be beneficial to most people while not harming the basic rights of the people who do not like the law.

Tips for Decreasing the Difficulty of the Project:

Instead of changing a law, have students consider rules that exist at the afterschool center or in their classrooms that they would like to change. The initial process of outlining the problems would be the same as in Project Activity #3, but the process of change would not be as complicated. When students are asked to complete the map of how a bill becomes a law, provide sentence strips that each contain one of the necessary steps for a bill to become a law. Ask students to put these sentence strips in the order that appears in the SchoolHouse Rock video.

EVENTS THAT CHANGED THE WORLD:

The American Revolution

Project Overview:
Students will study history from a wide variety of sources and understand how one event can have a profound impact on how the world operates. The idea of change will be considered in two different contexts during the course of this lesson: how forces and events can lead people and nations to want a change in the way their society works; and how one event can drastically change the course of history for future generations all over the world. Through the project, students will learn about the American Revolution using historical texts, videos and role-playing activities that will clarify the abstract ideas of tyranny and rebellion.

Student Goals

- Students will collect and organize information on American history by accessing a variety of different sources including videos and texts.
- Students will gain an appreciation of historical events by conducting role-playing activities designed to demonstrate historical realities.
- Students will build on their understanding of the democratic process by examining the causes of the American Revolution, especially taxation without representation.
- Students will gain both a familiarity with the basic causes of the American Revolution as well as the historical context of its ramifications on modern-day American life.

Student Motivation/Mini-Lesson:

Ask students to share any knowledge they have about how the United States became a nation. To help jump-start the conversation, ask students basic questions about the U.S. How old is the United States? Who is known as the father of our country? What does July 4th celebrate? It may also be helpful to introduce some terms in the context of the opening conversation, including (but not limited to) independence, revolution, tyranny, rebellion and sovereignty. Tell students that as they look at the history of the American Revolution they should consider what caused people to want to make a change in the way they were ruled, and what effect that desire for change has on the world today.

Once students have compiled as much as they know about the American Revolution, give some background on the idea of people making changes in society. In the context of the American Revolution, most people in the country felt that they were not being treated fairly by England, the country that ruled over the American colonies. As people began to feel angrier about this treatment, they decided to rebel and take actions to change the way things were. Read a passage from *If I Lived...at the Time of the American Revolution*, about the Boston Tea Party, as evidence of the kind of action people take when they want a change in the way they are governed. Add a discussion about how American settlers, while angry at British tyranny, treated Native Americans in much the same way that the British treated them.

Materials Needed

- SchoolHouse Rock Video "No More Kings"
  Note: See Appendix M for song lyrics.
- Character descriptions
- Fake money for role-playing activity
  Note: See Appendix I.
- *If I Lived...at the Time of the American Revolution*, Scholastic Books

Project Activities

1. WATCH "NO MORE KINGS"

Play the video clip "No More Kings" (see Appendix M for song lyrics) which gives a brief overview of the desire to create a democratic government. Ask students to listen carefully to the words and answer the following questions: **What problems do the people have with the king? What is "taxation without representation?" What do people finally tell the king?**

2. REINFORCE "NO MORE KINGS" WITH A ROLE-PLAYING ACTIVITY

Divide students into groups of four. Tell students that each group will represent its own country. **Give all students a character description that outline who they are in their fictional country.** One student will be the **"Ruler"** (the king or queen) of the country. The description says: "Selfish Ruler wants a big army. The Ruler wants 50 pieces of gold or 10 horses for an army. The Ruler thinks the farmers are foolish people." Two students will be **"Farmers."** Their description says: "The Farmer owns 10 pigs, 10 cows, 10 horses and 10 gold coins. The Farmer wants more land to grow food." One student will be the **"Merchant."** The description says: "The Merchant owns 100 gold coins. The Merchant wants more land to open a new mall." Tell students that the Rulers need to build their army and need to ask their subjects for the horses and money. After the Ruler asks for money, the subjects (Farmers and Merchants) must ask for more land. Whatever the Ruler decides will be the law. **Once the exercise is over, ask students to think about what happened and if it was fair to everyone.**

Note: This activity is optional.

3. REPLACE EACH MONARCHY WITH A DEMOCRACY

Students will now go back into their groups of four from Project Activity #2 in order to decide the outcome in a democratic fashion. Students will all have the same descriptions, except the "Ruler" is now the "President" and the people elect him or her (the president cannot vote). Conduct the same exercise as outlined above. Remind students that they will vote on the outcome at the end of the exercise. **Have students compare the results of the two different processes.**

Project Wrap-Up & Enrichment

Students should think about how people tried to make a change before the American Revolution. Encourage them to create some artifacts that represent the colonists' anger and desire for change. Examples of these artifacts include signs of protest that colonists would hold, a descriptive drawing of the Boston Tea Party or the signing of the Declaration of Independence, a newspaper article complaining about the British and encouraging people to take action or an advertisement for people to join the revolutionary army. Students should also consider the idea of revolution and change in a historical context. Ask students to write down their responses to the following questions: What would life be like if we still lived under British rule? Did changing to our new system into a democracy mean that all people are treated fairly (think about the role-playing activity)? How do we change governments we do not like in today's society? How is the world different because of the United States?

Encourage students with a great interest in the history of the American Revolution to read more about the causes, the battles and the aftermath. Students who decide to do an end-of-curriculum presentation on the American Revolution might want to consider writing a play about the colonists and their desire for change or a summary of ten ways the United States has changed the world and how things might have been different if America had lost, or never fought, the Revolutionary War.

Note: The play could be about an actual event, such as the Boston Tea Party, or a fictional account of people fighting British tyranny. Some ways the U.S. has changed the world could include space travel, fighting in two world wars or Disney World.

Tips for Increasing the Difficulty of the Project:

Have some students make a Cause and Effect Chart of the Revolutionary War with an additional "During" column. The chart would list the major causes of the war in the "Cause" section, the major battles and events in the "During" section and the main results of the war in the "Effects" section. Students could write their own SchoolHouse Rock-style song about how people decided to fight to create the United States and what it is like today, 220 years later.

Tips for Decreasing the Difficulty of the Project:

At the beginning of the lesson, if students demonstrate very little knowledge of the American Revolution, it may help to give a longer introduction about the basic facts of how the country was formed. There are a number of child-centered videos, including some in the SchoolHouse Rock Video collection, that could be substituted for many of the books which are at a higher reading level. Those titles include "Shot Heard 'Round the World" and "Independence Day" (see Appendix M for song lyrics).

CHANGING STYLES:

How People Dress to Meet a Changing World

Project Overview:

This project will take a close look at the clothes people wear and what those clothes say about them and the culture in which they live. Students will begin the project by looking at what they wear and understanding what it says about them. From this point, students will look at other fashions in this country and around the world. Students will then use various references to study fashions of times past and decide what those outfits say about the people who lived back then. Finally, students will consider all of the different fashions they have observed during the course of the lesson and conduct an activity that shows their understanding of how fashions change to reflect the spirit and values of the time.

Student Goals

- Students will utilize different books and visual references to learn about fashion and the role it plays in expressing who people are.
- Students will learn about changing fashions in our culture and around the world, and gain an understanding of the causes and effects of these changes.
- Students will critically evaluate their own fashions to better understand the messages they send with their clothes and other fashion-related items.
- Students will demonstrate the changing nature of fashion and the role these changes play in defining a culture or society.

Student Motivation/Mini-Lesson:

Introduce the story *King Long Shanks* or *The Emperor's New Clothes* fable to the class. Tell them that each story is a funny look at how people can be convinced that anything looks good on them with enough flattery. Discuss what it means to flatter someone and why people do it. After students discuss the idea of flattery, read one or both stories. After completing the reading, ask students why the King or the Emperor thought he looked so good. How do the people react to him? Who is loyal to the King or the Emperor at the end of the book? If you read the fable version, ask why the young child is so honest when everyone else tells the Emperor he looks good. Complete the discussion of why people sometimes do not tell the truth when asked if what others are wearing looks good.

After discussing the story or stories, inform students that this project is going to focus on how people dress and how those styles change over the years. Ask students why they think styles are always changing. Why is it that ten years ago everyone wanted to wear one kind of shoes and now they all want to wear a different kind?

Materials Needed

- *Bartholomew and His 500 Hats* by Dr. Seuss
- *King Long Shanks* by Jane Yolen or *The Emperor's New Clothes* fable
- *Costume,* Eyewitness Books
- *Fashion Then & Now* by Roberta Collier Morales (Costumes for Coloring Series)
- *Fashion Through the Ages* by Penny Ives, Margaret Knight and Kim Dalziel
- Old newspapers, magazines and photographs of people dressed in various styles
- Costume making supplies: cloth, fabric swatches, pieces of felt, construction paper in a variety of colors, glue, scissors, tape and crayons

Project Activities

1. IDENTIFY FASHION TRENDS

Have students use the resources listed above, as well as any other history-related books, magazines, newspapers or videos, to identify at least four different dressing styles of the past. Styles must be at least ten years apart. Suggest that students think back to the “If I Lived…” projects. Students may want to look in those books and resources to find examples of different styles. Have students ask their parents or other teachers what kinds of clothes they wore when they were growing up. Pictures of these styles would be especially helpful for students. Let students watch portions of videos that have people dressed in different types of clothing in the past. For example, students could look at television shows like Happy Days for the 1950’s, The Brady Bunch for the late-1960’s and The Jeffersons for the 1970’s. They could also see parts of movies like Grease, Hercules or Robin Hood: Prince of Thieves for the dress of different times.

2. MAKE A TIMELINE FOR DIFFERENT FASHIONS

Once they have conducted some research on the topic, **ask students to make a timeline of fashions that includes their four examples of styles worn at different times throughout history.** The timeline could begin as far back as cavemen or as recently as the 1960’s. Students should try to find pictures for each style they choose, or make their own drawings to illustrate how men, women and children looked at these different times. Suggest that they also include things like hairstyles and jewelry.

Project Wrap-Up & Enrichment

Students will pick out their favorite style or costume and design a wardrobe for themselves. The easiest way to do this might involve fashioning construction paper models of the different styles they observe. Students might also require swatches of fabric or felt to help create some of the looks they are trying to establish. Once students have completed their costume they will prepare it for display at a fashion show. Some students may be too shy to actually model what they have created. Let those students build some sort of mannequin where they can hang the clothes they have made. Try to encourage students to make their own clothing and not to rely on finding clothes from years ago.

Have students interested in completing an end-of-curriculum presentation on this project research more about the styles of the times they selected in their timelines. For example, students could conduct research on the other cultural elements of a given time. These elements could include music, books, television or movies (if applicable), games and other trends. Students would include all this information—with examples if possible—as part of their multi-media timeline of style.

Tips for Increasing the Difficulty of the Project:

Have some students include a written description of the different styles they found with their fashion timeline. For each of these descriptions, students should include the names of the different fashion statements. Challenge students to find at least one example of fashion from over 100 years ago for their timeline. Through research, they should try to find out what made this style popular and if there was any practical reason for wearing clothes such as this. For example, they might find that people in the Middle Ages wore armor because they were often attacked by people with swords that could not penetrate armor.

Tips for Decreasing the Difficulty of the Project:

Rather than creating a timeline of fashion, have students identify one style they particularly like and create their own representation of that clothing.

A PLAY ABOUT CHANGE

Project Overview:
Students will dramatize a story that encompasses the process of change. Using all of the preceding lessons as sources of inspiration, brainstorm with students about ideas for small scenes that all deal with the concept of change. Small groups of students will then meet together to form teams that will create the basics of the scene they want to put together. The process of this scene creation will involve brainstorming characters and creating a setting where the change will take place. Finally, students will analyze what types of conflict this change will bring about. Once these elements are established, help students build dialogue and create a dramatic scene or scenes. Students will then perform their scene for the entire class.

Student Goals

- Students will review the many facets of change that have been studied during the course of this curriculum and will select one topic based on their interest.
- Students will learn the basic elements of dramatic writing (including the importance of conflict) and production through a series of brainstorming sessions that will help students build characters, settings and plots.
- Students will understand the importance of dramatic expression in reading for a play and will concentrate on telling the story of the play through tone of voice, body language and general expressiveness.
- Students will write and edit dialogue incorporating critical feedback from other students as well as teachers.

Student Motivation/Mini-Lesson:

The first step will be to have students think about all of the things that go into making an exciting or interesting play, television show or movie. These ideas should also be listed on a separate sheet of paper. Try to boil down these ideas to some main ideas such as tension, suspense, conflict, emotion and humor. Once this is completed, tell students that they are about to build a play around the idea of change. For this purpose, students will want to consider only ideas surrounding change that have interesting or exciting elements. For example, a play about how colors change might be hard to make very interesting, but it is possible.

Note: They will also probably mention categories such as movie stars and special effects which will not be part of this project.

Materials Needed

- A fertile imagination
- Whatever props students feel they need to put on their play

Project Activities

1. SELECT A TOPIC

Create an idea web with the title **"Issues List Brainstorm: What Types of Changes Have We Seen in the World Around Us?" and have students cite as many examples as they can. From those ideas charted, have students choose one that interests them most.** They should be careful to make sure that the topic they choose can be acted out in some way. Ask students a few questions about their change idea, such as: What were things like before your change? What were things like after your change? What or who caused the change you chose? Who or what was affected by the change you picked?

Note: The list will not necessarily be limited to the changes associated with different lessons. Students will no doubt have thought of many kinds of personal changes that they have noted since they began keeping a writer's notebook. In addition, some students may have already discovered other change-related ideas while conducting one of the projects in this curriculum.

2. SELECT CHARACTERS

Create another idea web entitled **"What Kinds of People, Animals or Things are Usually Thought About When you Mention the Kind of Change You Picked?"** Look at each change idea that was listed in the first idea web and prod students to consider who would be involved in those kinds of changes. Students may also identify characters from novels, videos or historical texts encountered during the project. **Have students choose someone from the list of people that interests them and who they would like to act out.** Ask students the following about their character: Who does your character like and dislike to be around? Where does your character like and dislike to "hang out"?

3. CREATE A SETTING AND PLOT

Have students give their characters a setting and plot by pairing their favorite change idea with their chosen character. Tell students to be careful to choose a person and change idea that are related in some important way. If students decide on a person and a time that do not match (i.e. a modern student in dinosaur times) then their scene should focus on the person attempting to adjust to very different circumstances.

4. WRITE AN OUTLINE

Tell students that their story needs to accomplish four things: introduce the character they chose and where he or she is located; have the character talk with other people before the change happens; have the character talk with other people after the change happens; and teach how the character learns to adjust to the new change. Have students write down a conversation for each event. If students are stuck, encourage them to work with a partner. Students can then have informal trial runs of different conversations until they find a suitable way for the characters to interact.

5. ACT OUT THE SCENE OR SCENES

Once students have written down the basics of the conversation, have them work with a partner to act out the scene. In order to prevent students from simply reading from a script with no emotion, encourage students to say a number ("one," "two," etc.) instead of the line. They should try to convey the meaning of the line they have written through tone of voice and expression.

Project Wrap-Up & Enrichment

Once students are familiar with the action of the story and how they hope to act it out, have them write a final script. The script will contain all the components of the storyline from the introduction, to the change itself and culminating with the lessons learned. Encourage students to perform their scene with a partner for their parents, teachers and other students.

Tips for Increasing the Difficulty of the Project:

Have some students write three or four detailed scenes that concentrate on each aspect of the change outlined above. Students will be careful to document the cause of the change as well as its ramifications.

Tips for Decreasing the Difficulty of the Project:

Some students may simply want to dramatize a story they have already read for a previous lesson. In this case, students would need to change the story into play format. This will include writing a detailed script for the play that closely follows the action of the book or story in question.

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APPENDIX A:

Reference List for Book Making Ideas

This appendix accompanies the following lessons:

- Changing Your Mind: *Green Eggs and Ham*
- If I Could Change the World

This appendix will help teachers create books, journals and albums with students.

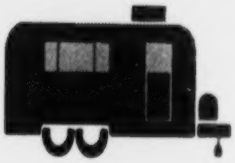
Further information can be gathered at:

- amazon.com

Reference List:

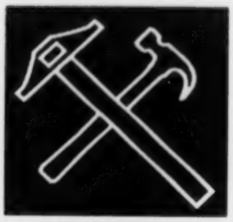
- *Cover to Cover: Creative Techniques for Making Beautiful Books, Journals & Albums* by Shereen Laplantz
- *Making Books by Hand: A Step-By-Step Guide* by Mary McCarthy, et. al.
- *The Art of the Handmade Book: Designing, Decorating, and Binding One-Of-A-Kind Books* by Flora Fennimore
- *Books, Boxes, and Portfolios: Binding, Construction, and Design, Step-By-Step* by Franz Zeier

APPENDIX B: Riddles Worksheets; Making Inferences Exercise

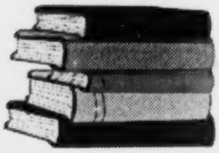


This appendix accompanies the following lesson:

- Before and After: Reading Stories to Find Cause and Effect



This appendix will help teachers introduce the idea of cause and effect.



This appendix was adapted from:

- Rural High School Girls in Science Program, a division of The Northwest Center for Research on Women, University of Washington

Further information can be gathered at:

- http://weber.u.washington.edu/dl4/nwcrow/projects/rrlgrls/camp/observelp.html

Riddles Worksheet

Materials Needed:

- Riddles Worksheet for each student

Note: Hand out either the long or the short version of Riddle I, depending on students' ability. The long version is for higher performing students or for students who would like more of a challenge. The long version includes underlined vocabulary words which could be incorporated into an additional lesson or could provide students with an extra exercise for their journals.

Directions:

Discuss the concepts of cause and effect and how students might look for clues to uncover the causes of certain outcomes they read about or experience. Show students how to use a Cause and Effect Chart to organize the clues they find (a description of Cause and Effect Charts can be found in the Explanation of Common Terms section of the Introduction). Complete a Cause and Effect Chart as a group. Make copies of the appropriate version of Riddle I and Riddle II. Distribute one of each to every student and have them complete the worksheets individually or in groups.

Riddles Worksheet: Riddle I *(long version)* Name: ____________________

Directions: Read the following riddle and use the Cause and Effect Chart below to help solve it.

It was a cold and rainy December night. The phone rang and rang but no one answered, causing the cat out from under the couch. George and Martha lay immobilized on the floor, dead. There were no footprints and no blood. There was water all around them. They were soaking wet and absolutely stark naked. There were pebbles and broken glass everywhere. There were no other significant clues to the murder. The house was hushed except for the sounds of a television that drifted in from another room and the meow of a distant cat that could be heard faintly in the distance.

The maid walked in the room and peered at George and Martha on the floor, gasped and finally screamed. The next door neighbor heard the scream and called the police. As we will see, this call was a bit premature.

The police officer walked in the room, bitter from having been woken up in the middle of the night, and sighed when he saw George and Martha. The police officer was completely unsympathetic to what had happened. "This is no crime!" he said in exasperation. "Well, as long as I am here, we might as well find out who killed them," he said impatiently, wanting to get back to bed. The officer began to prod the maid to answer his questions. She stated, rather unconvincingly, that she was completely alone in the house. He then glanced at the dirty box in the corner of the room and said, "Just as I suspected. I know who the killer is!"

Who killed George and Martha and how did he or she do it?

Cause and Effect Chart

Cause *(don't know)*	**Effect *(what happened)***

Riddles Worksheet: Riddle I *(short version)* Name: ____________________

Directions: Read the following riddle and use the Cause and Effect Chart below to help solve it.

It was a cold and rainy December night. George and Martha lay dead on the floor. The maid walked into the room and screamed, causing the cat out from under the couch. There were no footprints and no blood. There was water all around them. They were soaking wet and absolutely stark naked. There were pebbles and broken glass everywhere. The house was silent except for the sounds of a television left on all night, the banging of a loose shutter and the meow of a distant cat.

How did George and Martha die?

Cause and Effect Chart

Cause *(don't know)*	**Effect *(what happened)***

Riddles Worksheet: Riddle II Name: ____________________

Directions: Read the following riddle and use the Cause and Effect Chart below to help solve it.

You are flying in a plane somewhere over the Pacific Ocean. Suddenly the plane starts to shake, rattle and roll. It pitches forward and heads for the sea below. At the last moment, the pilot sees a small island and crashes the plane on the beach. You are the only survivor. Upon searching the beach you find a note from the last visitor on the island. The note says:

> "Welcome to GooBadia Island. I am an anthropologist with Harvard University. I have discovered two tribes—a good tribe and a bad tribe. The good tribe has wonderful food and beautiful houses, and they are very friendly. The bad tribe is smelly and nasty and, worst of all, they are cannibals! Both tribes look and dress alike, however each member of the good tribe always tells the truth when asked a question while the bad tribesmen always lie. If you follow the trail ahead, you will come to a fork in the road where a guard is stationed. I don't know if he is a good or a bad tribesman. I must think of a question to ask the guard that will guarantee that I go down the trail to the good tribe. I can no longer wait to think of a question so I have left this note for any future visitors. Good Luck!"

What one question can you ask to make sure you get directed to the good tribe?

Cause **Effect**

Answer if Guard is from Good Tribe:

Question:

Answer if Guard is from Bad Tribe:

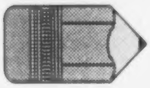
Making Inferences Exercise

Goals:

- To examine the differences between observations and inferences;
- To explore the role prior knowledge plays in a scientist's ability to draw accurate inferences;
- To examine what role tools play in a scientist's ability to make observations.

Time:

1 to 1½ hours with pre- and post-project discussions.



Materials Needed:

- **Station 1**: four same-size containers with clear liquid in them (e.g. vinegar, rubbing alcohol, Karo Syrup and water)
- **Station 2**: a large box with a door cut in the sides; objects of many sizes, shapes and textures
- **Station 3**: four same-size boxes with different size, shape and number of objects inside
- **Station 4**: squeeze bottles with cotton balls soaked in four different scents (e.g. vanilla, lemon, banana, peppermint)
- **Station 5**: one box with many holes on all sides, 10-20 pegs to fit into the holes, one object (e.g. a toy car or stuffed animal)
- **Station 6**: cornstarch mixed with water and green food coloring

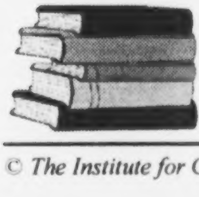
Discussion:

Set up the six stations around the room. Have students work in groups of two to four, depending on the size of the class. Let each group spend a few minutes making observations and answering the questions in the lab at each station. Tell students when to move to alleviate crowding. Have students answer the final questions in the lab and discuss their findings with the class after visiting all six stations.

To do after all the observations have been made: compare students' observations; encourage students to challenge and comment on each other's observations; discuss the distinction between observations and interpretations and the difference between identifying and naming an object and determining its properties; examine the range of properties observed by different students at the same station; compare the limitations imposed by the instructions at each station and those faced by scientists observing the earth.

Students are usually very excited about making the correct identification of all the objects and materials, but the emphasis should be placed on describing the properties of the objects rather than just naming the objects. Explain that when students are naming the objects they are inferring or drawing conclusions based on their observations. The importance of the use of tools in science can be discussed when reviewing Station 5. The importance of having some prior knowledge can be discussed in relation to all of the stations, particularly Station 6.

Note: Place Station 6 near a sink as it can get messy. At Station 6, students can use all their senses, but they often have difficulty determining what the material is unless they have played with cornstarch before.



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- University of the State of New York. *Earth Science Syllabus.* Albany, New York: The State Education Department, Bureau of General Education Curriculum Development, 1985.

Instructions:

Tell students to think as scientists, using all five of their senses to make observations just as a scientist would. What else do scientists use? They use their brains and prior knowledge (what they already know) about the world. Generate class discussion with questions: How are our senses used to observe the world around us? How do we draw inferences from our observations? Remind students to read the instructions at each station carefully, make their observations and inferences and answer the questions.

Station 1:

1. **DO NOT TOUCH THESE CONTAINERS.**
2. Look at the contents.
3. Observe and describe the properties of the liquids.

? • What sense(s) are you using to make observations at this station?

? • Are there other senses you would like to use but cannot?

? • Can you make inferences about what materials are at this station?

Station 2:

1. **DO NOT LIFT, OPEN OR LOOK INSIDE THIS BOX.**
2. Reach inside the box through the opening and from the feel of the materials, describe the properties of the objects in the box.

? • What sense(s) are you using to make observations at this station?

? • Are there other senses you would like to use but cannot?

? • Can you make inferences about the identity of the objects at this station?

Station 3:

1. **DO NOT OPEN THESE BOXES.**
2. Lift, gently shake or tip the box to observe the object inside.
3. Describe the SHAPE and NUMBER of the objects inside the box.

? • What sense(s) are you using to make observations at this station?

? • Are there other senses you would like to use but cannot?

? • Can you make inferences about the identity of the objects at this station?

Station 4:

1. **DO NOT OPEN THESE CONTAINERS.**
2. Gently squeeze the containers to smell the contents.
3. Describe what the scents smell like.

? • What sense(s) are you using to make observations at this station?
? • Are there other senses you would like to use but cannot?
? • Can you make inferences about what materials are at this station?

Station 5:

1. **DO NOT LIFT THIS BOX OR OPEN THE LID.**
2. Poke the stick straight down through any 10 holes in the box.
3. Observe the object inside and describe its properties.

? • What sense(s) are you using to make observations at this station?
? • Are there other senses you would like to use but cannot?
? • Can you make inferences about the identity of the object at this station?

Station 6:

1. Touch, smell, lift or examine the material in this box.
2. Describe its properties.

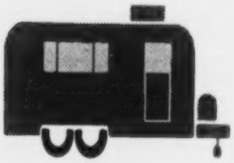
? • What sense(s) are you using to make observations at this station?
? • Are there other senses you would like to use but cannot?
? • Can you make inferences about what materials are at this station?

Summary Questions:

- What did you use to make observations at each of the six stations?
- How did you extend your powers of observation at Station 5? Why did you need to?
- At Station 6, you were able to use all of your senses. Was it easy or difficult to infer what this material was? Explain why.
- At each of these stations, you were using more than just your senses to make inferences. What else were you using besides your senses?
- What is the difference between observations and inferences?

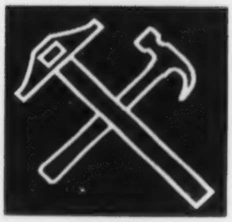
APPENDIX C:

Book List for Additional Enrichment

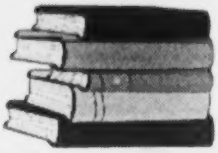


This appendix accompanies the following lessons:

- Before and After: Reading Stories to Find Cause and Effect
- Changing Moods and Emotions
- Changing Peanuts into Peanut Butter
- If I Lived 100 Years Ago: Immigrants Arrive in New York City



This appendix will help teachers find additional reading materials.



This appendix was adapted from:

- Carol Hurst's Children's Literature Site

Further information can be gathered at:

- www.carolhurst.com

Introduction:

The following is a list of suggested reading materials (organized by book type and grade level). Carol Hurst's Children's Literature Site also features book lists, activities, lessons and web site suggestions on several curriculum areas, including history, science and art.

Book List

Picture Books

For Pre-Kindergarten and up:

- *Hattie and the Fox* by Mem Fox; ill. by Patricia Mullins
- *If You Give a Moose a Muffin* by Laura J. Numeroff; ill. by Felicia Bond
- *In a Cabin In a Wood* by Darcie McNally
- *Little Blue and Little Yellow* by Leo Lionni
- *The Mitten* by Jan Brett
- *My Place in Space* by Robin and Sally Hirst
- *The Napping House* by Don and Audrey Wood
- *Tuesday* by David Wiesner
- *The World that Jack Built* by Ruth Brown

For Kindergarten and up:

- *Chester's Way* by Kevin Henkes
- *The Great Kapok Tree* by Lynne Cherry
- *Ira Says Goodbye* by Bernard Waber
- *Julius, the Baby of the World* by Kevin Henkes

For First Grade and up:

- *Araminta's Paint Box* by Karen Ackerman; ill. by Betsy Lewin
- *Elizabeth and Larry* by Marilyn Sadler; ill. by Roger Bollen
- *Emily and the Enchanted Frog* by Helen V. Griffith; ill. by Susan Condie Lamb
- *Jumanji* by Chris Van Allsburg
- *The Mud Flat Olympics* by James Stevenson

For Second Grade and up:

- *Amelia's Road* by Linda Jacobs Altman
- *Bird Watch* by Jane Yolen
- *Cecil's Story* by George Ella Lyon
- *Coyote Dreams* by Susan Nunes; ill. by Ronald Himler
- *Emma* by Wendy Kesselman; ill. by Barbara Cooney
- *Fanny's Dream* by Mark and Caralyn Buehner
- *Fly Away Home* by Eve Bunting; ill. by Ronald Himler

- *Miss Rumphius* by Barbara Cooney
- *A River Ran Wild* by Lynne Cherry
- *The Table Where Rich People Sit* by Byrd Baylor
- *The Widow's Broom* by Chris Van Allsburg

For Third Grade and up:

- *Pink and Say* by Patricia Polacco

Novels:

For Third Grade and up:

- *Castle in the Attic* by Elizabeth Winthrop
- *The Ghost Belonged to Me* by Richard Peck
- *Grasshopper Summer* by Ann Turner
- *Ida Early Comes Over the Mountain* by Robert Burch
- *Maniac Magee* by Jerry Spinelli
- *Number the Stars* by Lois Lowry

For Fourth Grade and up:

- *Afternoon of the Elves* by Janet Taylor Lisle
- *Autumn Street* by Lois Lowry
- *The Barn* by Avi
- *Bull Run* by Paul Fleischman
- *Dateline: Troy* by Paul Fleischman
- *Everywhere* by Bruce Brooks
- *Homecoming* by Cynthia Voigt
- *The Night Journey* by Kathryn Lasky
- *The Night the Bells Rang* by Natalie Kinsey-Warnock
- *On the Far Side of the Mountain* by Jean Craighead George
- *Redwall* by Brian Jacques
- *Shades of Gray* by Carolyn Reeder
- *Tom's Midnight Garden* by Philippa Pearce
- *Tuck Everlasting* by Natalie Babbitt
- *What Jamie Saw* by Carolyn Coman

For Fifth Grade and up:

- *Catherine Called Birdy* by Karen Cushman
- *The Foxman* by Gary Paulsen
- *The Giver* by Lois Lowry
- *I Am Regina* by Sally M. Keehn

- *I Am the Cheese* by Robert Cormier
- *Lyddie* by Katherine Paterson
- *The Midwife's Apprentice* by Karen Cushman
- *Nothing But the Truth* by Avi
- *The Pinballs* by Betsy Byars
- *Prairie Songs* by Pam Conrad
- *A Taste of Salt* by Frances Temple

For Seventh Grade and up:

- *Binge* by Charles Ferry

APPENDIX D:

Making Weather Instruments

This appendix accompanies the following lesson:

- Changing Weather

This appendix will help teachers create weather instruments with students.

This appendix was adapted with permission from:

- Saskatchewan Education. (1995 Revision). *Science: A Curriculum Guide for the Elementary Level.* Regina, SK: Author. Pages 229: 424-426.

Further information can be gathered at:

- http://www.sasked.gov.sk.ca/docs/elemsci/copyright.html

Introduction:

Students should have a sense of what they are measuring, why they are taking the measurements, how to take measurements accurately and what the measurements mean. Students should estimate what values they expect before measuring. The numbers obtained through measurement should make sense and lead to some understanding of the important concepts in "Changing Weather." Be sure that students do not get so wrapped up in the numbers that they are unable to relate to them in a meaningful context.

1. Building an Anemometer

Materials Needed:

- straws
- tape
- paper cups
- straight pins
- pencils

Directions:

Arrange four plastic drinking straws to form a cross and tape them together at the center. Tape one small paper cup to the end of each straw, so the closed ends of the cups all face the direction the anemometer rotates. Push a straight pin through the center of the straws into an eraser on the end of a pencil. This provides the axle along which the straws and cups will be able to rotate. Mark one cup to act as a reference. Measure the speed of the wind by counting the number of complete revolutions that the anemometer makes in one minute. The greater the speed at which it is rotating, the faster the wind is blowing.

The Beaufort wind scale uses visual cues to estimate the speed of the wind. Compare these visual descriptions of wind speed with the students' results. Also, students can listen to weather forecasts to obtain information about wind speed. The actual wind speed can be used to calibrate their anemometers.

Students will be able to appreciate how scientists use technology to take measurements and produce data which can then be used to make predictions. But as accurate as those predictions might be, there is always some uncertainty. Weather forecasting, even with the use of sophisticated modern technology, is still far from perfect. This reveals that, while technology has its benefits, it also has limitations to its usefulness. Reinforce the idea that scientists must be open to change when confronted with new evidence.

2. Building a Weather Vane

Materials Needed:

- straw
- pins
- pencils
- clay
- tape or glue
- cardboard

Directions:

Select a rigid drinking straw. Push a pin through the mid-point of the straw and into the eraser on the end of a pencil. At one end of the straw, attach some weight, such as a lump of modeling clay about the size of a marble. Tape or glue a rectangular piece of cardboard (about 6 cm by 12 cm) on the other end of the straw. Stick the sharp end of the pencil into a heavy ball of modeling clay. Place the weather vane outside. It will align itself so that the end of the straw with the lump of modeling clay will point into the wind. Use a compass to determine the direction from which the wind is blowing.

3. Building a Barometer

Materials Needed:

- surgical gloves or balloons
- jar
- rubber band
- glue
- straw
- paper
- marker

Directions:

Stretch a surgical glove or balloon over the mouth of a large jar and secure it with a rubber band, ensuring that there is a good seal. Glue the end of a drinking straw to the center of the glove or balloon. The other end of the straw acts as a marker.

Place the barometer close to a wall. Tape a sheet of paper on the wall, making a reference mark on the paper to show where the tip of the straw is pointing. Observe the end of the straw every day for a few days. The device will show that a change is taking place. Students should be able to infer what is happening to the air pressure depending on the direction that the straw moves. (If the pointer end of the straw moves up, atmospheric pressure is increasing.)

Note: Taping two straws together end-to-end exaggerates the markings, making changes easier to see. The barometer made in this activity is only sensitive enough to establish that a change in air pressure is taking place, not to make accurate measurements. After the home-made barometer has been observed for a few days, a more accurate barometer can be brought to class. This helps to point out some of the strengths of technology: devices which are manufactured to a high degree of precision help extend our senses, making it possible to measure what would be difficult to perceive otherwise. While the forecasts made from barometric readings alone may be inexact, when taken together with other weather indicators, they can add to the reliability of weather predictions.

4. Building a Rain or Snow Gauge

Materials Needed:

- clear tube
- ruler

Directions:

A rain gauge can be made from any regular cylindrical container (transparent containers are more convenient to use). Some rain gauges have a permanent scale attached to the side, but the same results can be obtained by measuring the depth of water in the gauge with a ruler. Once a reading is taken, the gauge is emptied and supported vertically to allow water to enter it the next time it rains.

A ruler can act as a snow gauge. Push the ruler into the snow to determine its depth. Once a measurement has been taken, remove the fresh snow so that the next time it snows only the new snow will be recorded. The measurements should be taken in some sheltered location, where drifting will not cause inaccurate readings.

Another aspect of this activity is to place a measured amount of snow into a transparent cylinder, allow it to melt and measure the height of water left in the container. Develop a relationship between the depth of snow and the equivalent amount of water that is produced when the snow melts. Extend this idea to explain why farmers rely on a heavy winter snowfall to provide moisture for the soil.

Note: A rain gauge can also be used to measure the amount of snowfall, but it is less convenient because it has to be cleaned out after use and it tends to get iced up.

5. Building a Hygrometer

Materials Needed:

- two thermometers
- cloth
- bowl

Directions:

Place two identical thermometers beside each other. Cover the bulb of one thermometer with a small piece of wet cloth. Put the wet cloth into a bowl to ensure that it remains wet continuously. The temperature reading on the two thermometers will differ—the difference depends on the relative humidity. Tables can be obtained to determine the relative humidity based on the two temperature readings. Take readings with the hygrometer in different places: inside the school; outdoors, in a sunny place, in the shade, in an open field. Variation in measurement will occur depending on where those measurements are taken. Students need to know the importance of using consistent methods and locations to obtain accurate measurements.

Note: How the hygrometer works: Heat is absorbed when water evaporates. On the wet bulb thermometer, the heat comes from the bulb of the thermometer and from the surroundings. The rate of evaporation depends on the temperature and on the amount of moisture in the air. At a given temperature, evaporation will occur more rapidly in dry air than in humid air. The greater the rate of evaporation, the more heat will be absorbed and the lower the temperature will be on the wet bulb in comparison to the temperature on the dry bulb.

APPENDIX E:

Light and Color Experiments

This appendix accompanies the following lesson:

- Changing Colors

This appendix will help teachers create and explore colors through additional class activities.

This appendix was adapted from:

- The Exploratorium. *The Science Explorer* (Exploratorium At-Home Book)

Further information can be gathered at:

- http://www.Exploratorium.edu

Black Magic—Discover the Secret Colors Hidden in a Black Marker!

Materials Needed:

- scissors
- white paper coffee filter
- black marker (not permanent)
- water
- coffee cup or mug

Directions:

- Cut a circle out of the coffee filter.
- With the black marker, draw a line across the circle about 1 inch up from the bottom.
- Put some water in the cup (enough to cover the bottom). Curl the paper circle so it fits inside the cup. Make sure the bottom of the circle is in the water.
- Watch as the water flows up the paper (when it touches the black line, you will start to see some different colors).
- Leave the paper in the water until the colors go all the way to the top edge. Ask the students: How many colors can you see?
- If available, repeat the experiment with a second black marker. Ask students: Does this marker make different colors than the first one?

Note: A second experiment is Center Stage: Use a clean, dry coffee filter circle. Use your marker to draw a black spot in the center. Put the circle on a saucer, and put a few drops of water on the spot. In a few minutes you will see rings of color that go out from the center of the circle to the edges.

Explanation: How Does Black Magic Work?

Most non-permanent markers use inks that are made of colored pigments and water. On a coffee filter, the water in the ink carries the pigment onto the paper. When the ink dries, the pigment remains on the paper.

When dipped in water, the dried pigments dissolve. As the water travels up the paper, it carries the pigments along with it. Different-colored pigments are carried along at different rates; some travel farther and faster than others. How fast each pigment travels depends on the size of the pigment molecule and how strongly the pigment is attracted to the paper. Since the water carries the different pigments at different rates, the black ink separates to reveal the colors that were mixed to make it.

This experiment uses a technique called **chromatography**. The name comes from the Greek words "chroma" and "graph" for "color writing." The technique was developed in 1910 by Russian botanist Mikhail Tsvet. He used it for separating the pigments that made up plant dyes.

There are many different types of chromatography. In all of them, a gas or liquid (like the water in this experiment) flows through a stationary substance (like the coffee filter). Since different ingredients in a mixture are carried along at different rates, they end up in different places. By examining where all the ingredients end up, scientists can figure out what was combined to make the mixture.

Chromatography is one of the most valuable techniques biochemists have for separating mixtures. It can be used to determine the ingredients that make up a particular flavor or scent, to analyze the components of pollutants, to find traces of drugs in urine and to separate blood proteins in various species of animals (a technique that is used to determine evolutionary relationships).

Why does mixing many colors of ink make black?

Ink and paint get their colors by absorbing some of the colors in white light and reflecting others. Green ink looks green because it reflects the green part of white light and absorbs all the other colors. Red ink looks red because it reflects red light and absorbs all the other colors. When you mix green, red, blue and yellow ink, each ink that you add absorbs more light. That leaves less light to reflect to your eye. Since the mixture absorbs light of many colors and reflects very little, you end up with black.

Reflecting Rainbows—Decorate Your White Walls with Colors!

Materials Needed:

- CD (If you do not own any CDs, you can buy an old one at a garage sale or ask at a record store if they will give you a CD that will not play.)
- sunshine (or a bright flashlight and a room that you can make dark)
- piece of white paper

Directions:

- Take the CD out of its case and take a look at the blank side (the side that does not have any printing on it). Tilt the CD back and forth and the colors will shift and change.
- Hold the CD in the sunshine. (If it is a cloudy day, turn out the lights and shine a flashlight at the CD.)
- Hold the white paper so that the light reflecting off the CD shines onto the paper. The reflected light will make fabulous rainbow colors.
- Tip the CD and see how that changes the reflections. Change the distance from the CD to the paper. What happens to the colors?
- Take a closer look at the CD. The colors on the CD are created by white light reflecting from ridges in the metal.

Explanation:

Like water drops in falling rain, the CD separates white light into all the colors that make it up. The colors reflecting from a CD are interference colors, like the shifting colors on a soap bubble or an oil slick.

Think of light as being made up of waves, like the waves in the ocean. When light waves reflect off the ridges on a CD, they overlap and interfere with each other. Sometimes the waves add together, making certain colors brighter, and sometimes they cancel each other out, taking certain colors away.

More Things to Do:

Rainbow colors and interesting patterns often appear when light reflects off or passes through something with many small ridges or scratches. These are called interference patterns. Here are several other ways to see interference patterns…

- Squint at a distant bright light at night. You will see starburst patterns around the light. If you look closely, you can see colors in the patterns. These patterns form when light bends around your eyelashes and imperfections in the layers that make up the lens of your eye. Tilt your head to one side while watching the pattern and notice that the pattern moves with you.

- In a dark room, look at a bright light (maybe a candle flame) through a nylon stocking, a silk scarf, a feather or a tea strainer. The pattern that you see depends on what you look through. Move the thing you are looking through and notice that the pattern moves with it.

- Buy a set of "rainbow glasses" in a toy store or a science shop. Through these glasses, all lights look like rainbows. The glasses are made with diffraction gratings, clear plastic that is etched with many lines.

APPENDIX F:
Advanced Electricity Experiment

This appendix accompanies the following lesson:

- Discovering Electricity

This appendix will help teachers enhance students' study of electricity.

This appendix was adapted from:

- *Bill Nye the Science Guy.* ELECTRICITY, Episode 18.

Further information can be gathered at:

- http://nyelabs.kcts.org/nyeverse/episode/e18.html

Introduction:

Electricity is kind of mysterious. You flip a switch, and the light goes on. You push the play button, and your personal stereo starts playing music. When you flip the switch or push play, you start a flow of electrons. Electrons are very tiny charged particles and electricity is the flow of electrons.

Electrons are found in atoms, the tiny pieces from which all stuff is made. We can make electrons flow in two ways. Batteries make electricity by mixing up chemicals—making a chemical reaction that forces electrons to move in a path from the battery to the personal stereo and back to the battery. Electricity that turns on lights in your home is made by power plants. Most power plants use big machines called generators to make electrons by twirling wire in a magnet. The magnet makes electrons in the wire move around, creating electricity. Electrons really know how to go with the flow.

Did You Know That…

- Electric eels use special organs in their bodies to make electricity?
- Electricity moves one foot every nanosecond (one billionth of a second)?
- Solar cells change light energy into electricity?
- Electrons are pushed by chemical reactions or generators?
- For electricity to do work, it has to flow in a closed path or circuit?
- Electricity is the flow of electrons, but electrons do not flow through everything? (You can test things for their electron flow-ability by doing this experiment.)

Materials Needed:

- two new, size D batteries
- one piece of wood
- electrical tape
- three 8-penny nails
- hammer
- one flashlight bulb
- pins
- two pieces of wire each 18 inches long and wire strippers

Directions:

- Have students put the two batteries in a row on the piece of wood and tape the batteries in place.*

  *The ends of the batteries need to be touching and facing the same way.

- Hammer a nail at the back of the flat-ended battery for each student, so that the nail touches the battery. Hammer the other two nails so that they touch the other end of the two batteries. Put one nail on each side of the thing that sticks out of the battery.

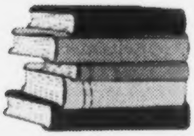
- Let students stick the flashlight bulb up between the two nails. Make sure the bulb touches the thing that sticks out from the battery. You might want to secure the bulb with some pins.

- Use the wire strippers to remove the plastic coating from the ends of the two pieces of wire. Wrap one of the wire ends around the back nail and wrap one of the wire ends around one of the front nails.

- Let students test their instrument by touching the two wires together.

Follow-Up:

See the light? You have completed an electrical circuit, a closed path that electrons flow around. You can test objects around the room to see if they let electrons flow. Just touch the wires to whatever you want to test. Be sure not to let the wires cross each other when you are testing and NEVER HOLD ON TO THE ENDS OF THE WIRES WITH YOUR HANDS. Things that let electrons flow are called conductors. Things that do not let electrons flow are called insulators. Some things let a little bit of electrons flow—they are called resistors.



Get charged up with these books about electricity:

- *Understanding Electricity* by Gary Gibson. Copper Beech Books, 1995.
- *Make It Work!: Electricity* by Wendy Baker and Andrew Haslam. Aladdin Books, 1993.

APPENDIX G:
Life and Water Cycle Activities

This appendix accompanies the following lesson:

- Understanding Cycles

This appendix will help teachers further explain the science behind certain cycles.

This appendix was adapted from:

- *NatureWater—Water and the Environment*. Prepared by Diane Higgins, MA, for Water Share, a program sponsored by the U.S. Department of the Interior.
- *Water Cycle in a Bag*. Prepared by Brian Brown and Kim Sheldrake-Formsma

Further information can be gathered at:

- http://209.21.0.235/waterlearn/teachers_room/naturewater/elem_lesson_plan.htm
- http://edcen.ehhs.cmich.edu/~kformsma/lesson_plan.html

NatureWater—Water and the Environment

Materials Needed:

- "Salmon and Steelhead Life Cycle"
- internet connection and computer(s) (optional)
- large piece of paper for making chart
- ruler
- felt pens
- wall map of Pacific Northwest and/or California

Background:

Salmon and steelhead have always been an integral part of Pacific Northwest ecosystems and human social structures. In rivers and streams from Alaska to California, these amazing fish migrate from their freshwater rearing grounds to the ocean where they grow large on a rich supply of food. When they are mature, after two to four years roaming the open seas, they return to the stream of their birth to spawn a new generation and complete their own life cycle. Except for steelhead, all Pacific salmon species die soon after spawning, and the nutrients they gathered in the ocean are released into the stream as their bodies decay. In this way, salmon bring a valuable gift back to the stream—nourishment for an ecosystem where nutrients are constantly being washed away by flowing water.

When European settlers arrived in the Pacific Northwest, they thought the supply of salmon was endless. However, as the population grew, so did the demand for water. When systems to deliver water to humans were designed, the fish were not the highest priority. Dams constructed to store water and generate electricity became impassible barriers to migrating fish. In California's Central Valley, the available salmon habitat throughout the Sacramento and San Joaquin river systems has been reduced from 6,000 miles to only 300 miles. The impact on fish populations was dramatic.

Removing water from rivers for human use means that there is less water available for the fish. As flows diminish and river levels drop, water temperatures tend to rise. Salmon and steelhead must have cold water to survive. The methods used for extracting the water can also harm fish. Diversion dams span the river and form barriers to migrating fish. Fish ladders and/or side channels for fish passage are often built, but they do not always work. Fry migrating downstream often swim into or are drawn into diversions that take water directly from the river. Placing screens over diversions can eliminate this problem. Large dams that block much of a river's natural flow can profoundly alter fish habitat.

The Sacramento River is home to the endangered winter run chinook salmon. There are four separate runs of chinook salmon in the Sacramento, which means fish may be hatching, rearing or migrating up- or downriver at any time during the year. Since the winter run is listed as endangered, most of the water management strategies implemented are geared toward the survival of these fish.

Society has become concerned about the fate of salmon in the Sacramento River and other streams. With public support, laws, funding and multi-agency commitments addressing the issue of salmon survival, time will tell if present efforts can secure a long term future for these magnificent creatures.

Preparation:

Starting from the "NatureWater Lesson Plans Teacher Resources" page, review and printout the five Problems/Solutions pages and "Salmon and Steelhead Life Cycles" and visit the other web sites listed. Use the following pages as resources. Make an overhead transparency or copies of the chart attached for students. Make all the on-line addresses for the web sites listed on the Resources page available to students so that they can simply link from that page to conduct research.

Note: If the class does not have access to the internet, have students use books or encyclopedias.

REFERENCE MATERIAL

Life Stage: EGG

Where are they?

In a river or stream bed, buried one to two feet deep in a nest of gravel, called a redd.

Habitat Needs:

- Clean gravel that water can flow through.
- Sufficient flows.
- Cold water temperatures.
- Plenty of dissolved oxygen.
- Nutrients supplied by egg yolk.
- No food is required.

Life Stage: ALEVIN (SAC FRY)

Where are they?

Still buried in the gravel. Now they can move around, but they stay buried for several more weeks. When their yolk sacs are empty, they must swim out of the gravel to find food.

Habitat Needs:

- Clean gravel that the fish can get to when they swim up (silted gravel can trap them).
- Sufficient flows.
- Cold water temperatures.
- Plenty of dissolved oxygen.
- Nutrients supplied by yolk sac on tiny fish's stomach.
- No food is required.

Life Stage: FRY

Where are they?

In the margins of the river or in places where the current is not too swift. As they grow bigger and stronger, they take up positions in swifter water.

Habitat Needs:

- Protection from predators—under cut stream banks, tree roots, submerged logs, deep pools, rocks, gravel and white water areas all provide cover.
- Cold water and sufficient dissolved oxygen.
- Mostly insects and other small stream dwelling animals for food.

Life Stage: SMOLTS

Where are they?

At some point just before or in conjunction with smolting, the fish begin their downstream journey. They may swim hundreds of miles, past many obstacles and dangers, before reaching the estuary. Most salmon remain in the estuary for some time, getting adjusted to the salt water and growing larger on new food sources.

Habitat Needs:

- Smolts need everything fry need.
- They also need straightforward, unobstructed downstream access to the ocean.

Life Stage: ADULTS

Where are they?

Adult fish roam the Pacific Ocean for two to four years. They may not have to travel far because the ocean just off the California and Oregon coastline is rich with food. When the fish become mature, they return to the river of their birth to spawn.

Habitat Needs:

- Adults in the ocean climb towards the top of the food chain as they grow larger.
- Protection from over harvest at sea.
- The warm ocean water of El Niño years hurt the salmon by reducing available food.
- Cold, oxygen rich water.
- When fish return to the river, they need sufficient river flows and free access to their spawning grounds.
- Most salmon stop eating once they enter fresh water.

Life Stage: SPAWNERS

Where are they?

Moving upstream and at the spawning beds, near the place of their own birth.

Habitat Needs:

- Sufficient water flows.
- Unobstructed access upstream.
- Cold, oxygen-rich water.
- Protection from poaching.
- Enough clean gravel for every fish to spawn.

Big fish, like chinook salmon, choose larger gravel while smaller fish, like steelhead, use smaller gravel. This helps reduce competition for spawning beds.

Life Stage	Where are they?	Habitat Needs	Problems	Solutions
Egg				
Alevin (sac fry)				
Fry				
Smolts				
Adults				
Spawners				

Questions for Discussion:

Ask students what they know about salmon and steelhead. Generate a class discussion to find out what students already know using the following questions:

- Has anyone seen a salmon or steelhead trout?
- Where do these fish live? Do they use more than one habitat during their lives?
- Are these fish important to people? Why?
- Does anyone know the status of salmon and steelhead populations in California?
- What is an endangered species? What is a threatened species?

Procedure:

- Allow students time to conduct on-line or encyclopedia-based research about the life cycle and habitat requirements of salmon and steelhead. Ask them to take notes as they research.
- Distribute the "Salmon and Steelhead Life Cycle" page or put the transparency on an overhead projector. Read it together and discuss the life cycle.
- Begin with the egg stage on the chart. Complete the first three columns with the students.

Follow Up:

- How many types of habitats do salmon and steelhead inhabit during their lives?
- What are the fish's consistent requirements while they are in fresh water?
- What do you think is happening to salmon and steelhead in our rivers today? Are fish populations healthy?

Share the Water

Introduction:

Students play a board game demonstrating the problems fish encounter because of people and the solutions people are providing.

Students will be able to:

- List at least three problems that can arise for fish from human use of water;
- List solutions to each of these problems;
- Explain what students can do personally to help fish.

Materials Needed:

- printed master copy of the Survival Game (linked from the Resources page)
- "Salmon and Steelhead Life Cycle" (linked from the Resources page)
- dice—one die for each student
- paper and pencils

Directions:

- Review the general background above, and the results of the first lesson.
- Make one copy of the game (two pages) for each pair of students.
- Ask students the following:
  - What is happening to salmon and steelhead populations in California?
  - What do you think are some of the reasons for the declining fish populations?
  - What human needs might conflict with the needs of the fish?
- Divide the class into pairs.
- Give each pair the first page of the game.
- Students will become fish for this game. Each student represents the eggs from one redd, about 5,000.
- As they go through their life cycle, the number of fish will decline as human-made problems take their toll.
- Explain the rules.
- Help students with the math if necessary.

Play the Game: *Without* Water Sharing

- Group students in pairs; give each student one die and paper and pencil for doing math.
- Have students write 5,000—the number of eggs in their redd—at the top of their paper.
- Visit each cell on the page, in order. Begin at the top left with the cell marked "1" and go clockwise following the pointing hands (matching the cycle of the "Salmon and Steelhead Life Cycle" illustration) and ending just below the starting cell.
- At each life stage, some fish will die. Read the description of the problem that took those fish's lives.
- Each student throws his or her die and notes the value.
- Figure out how many fish are lost by multiplying the value of the die by the factor shown on each square. For instance, if your throw a 2 in the first square, you will loose 200 fish (100 X 2)
- Keep a running total of the number of fish left after visiting each square.
- Continue until you get to the final square: Can't Find or Use Fish Ladder

First Round Assessment:

- Students should report the number of fish left after losses due to human use of water. Write the numbers on the chalk board and get a total.
- Ask students if there are other factors that limit fish populations. Discuss the fact that nature itself puts great pressure on fish populations. Predators, droughts, El Niño and floods are some ways fish can die from natural events.
- Even in ideal conditions, with no human-created problems, only a small percentage of the 5,000 eggs from each redd would survive to spawn. Often only two percent of the fish survive, even without human interference.
- Take two percent (multiply by 0.02) of your human impacted total to get the combined effect of natural limiting factors and human interference.

Play the Game: *With* Water Sharing

- The game is played exactly the same only now many of the problems have been solved—many more fish will survive.
- Calculate total number of fish again, then multiply by two percent (0.02). This is how many fish might survive when people implement all the water sharing methods we can.
- Compare the number of fish that survived with and without water sharing.

Note: Optional math—Figure the percent difference between populations with and without water sharing. For each scenario, find the percentage of the fish population that survived.

Follow Up:

- What were some of the problems humans caused for the fish?
- What were the solutions to those problems?
- What can you personally do to help fish?
- Explore other information provided at this web site:
    - What methods are farmers using to conserve water so the fish will have enough?
    - What water conservation methods can families use at home?
- Complete the Solutions column on the "Salmon and Steelhead Live Cycle."

Water Cycle in a Bag

Introduction:

This lesson is a hands-on activity to show students how the water cycle functions and to let students explore the phenomenon of the water cycle. The lesson is a representation of condensation and evaporation.

Materials Needed:

- Zip-lock bag (one per group)
- masking tape
- small contact vial
- water
- grease pencil
- activity sheet (attached)

Key Question: What happens in the recycling of water?

Procedure:

Each group should build the water cycle using the activity sheet. Before taping the vial in the bag, fill it three-quarters full with water and make a colored mark on the vial to show the initial level. The vial should be taped near the corner of the bag. The bag is then sealed and taped to a window that receives direct sunlight. Each group should check and draw their bag every day.

Discussion Questions:

- What does the vial represent?
- What does the bag represent?
- What does the water in the vial represent?
- Why was the bag sealed?
- Describe the changes you saw on the bag, in the vial, etc.
- Does the water leave the vial faster on sunny days or cloudy days?
- Where is the water on the bottom of the bag coming from?

Name ____________________

Water Cycle in a Bag
Activity Sheet

INSTRUCTIONS:

- Place your mini-water cycle in a sunny place.
- Draw a picture of what happened to the water in the vial.

Day One

Level in the cup: _______ cm

Day _________

_______ days _______ cm

Day _________

_______ days _______ cm

Day _________

_______ days _______ cm

APPENDIX H: Calendar and Day Planner Black Line Masters

This appendix accompanies the following lesson:

- Time Marches On

This appendix will help teachers create calendars and day planners with students.

On the following pages are master copies of…

- a calendar
- a daily planner

…to be duplicated for students.

Hour	Activity

APPENDIX I: Cash Register Sheet; Bank Street Games; Activities Using Money

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This appendix accompanies the following lesson:

- Making Change: Turning Money into Stuff

This appendix will help teachers foster students' understanding of spending and saving.

This appendix was adapted from:

- Bank Street College of Education (New York City)

Further information can be gathered at:

- http://www.plan.ml.com/family/teachers/teach_p3.html

On the following pages are master copies of…

- an invoice
- Money Equivalents
- the Spend or Save? Game

…to be duplicated for students.

Activity 1: Money Equivalents

Materials Needed:

- Money Equivalents page

Introduction:

Before children can understand the importance of saving, they must learn the value of money. The Money Equivalents page introduces students to the different denominations of U.S. coins and paper currency, showing the value of each and the relationships between them.

Directions:

- Make copies of the Money Equivalents page and give at least one to each student.
- Have students discuss what they know about the value of money. Use the Money Equivalents page to highlight specific denominations and equivalents.
- Suggest that students color the coins and dollar bill on the Money Equivalents Sheet.
- Work with students, either as a class or in small groups, to help them understand the relationships between the coins and the dollar bill. Devise games or puzzles based on the students' number skills.

Note: For example, students can try to determine how many combinations of coins and bills equal a certain value. Have the students show their combinations using the Money Equivalents page as a model.

Activity 2: Making Graphs with Cut-Out Coins

Materials Needed:

- Money Equivalents page

Introduction:

Discuss projects for which the class might want to raise money. Encourage students to suggest ideas. Have students find out more about the projects and their costs, and evaluate each possibility. Choose the project as a group and plan a strategy for raising money. The plan can be as simple or as elaborate as students' enthusiasm, time and resources allow. Establish a realistic goal.

Note: Examples of projects include raising money to assist a local program or charitable organization that helps children or serves the community; to purchase supplies or equipment for school projects; or to defray the cost of a class trip. Strategies for raising money include collecting bottles and cans for recycling; soliciting donations in or near the school; or sponsoring a bake sale, rummage sale or show.

Directions:

- Have students work individually or in small groups.
- Give each student a Money Equivalents page and have them color the coins. Let them choose the colors, but emphasize the importance of using one color per denomination.
- Have students cut out the colored coins and use the cut-out coins to monitor the progress of the fund-raising project.
- Paste the cut-out pennies, representing a specific amount, onto sheets of paper as the money is collected (for example, have one penny = 50¢; five columns with 10 pennies per page).
- Display the completed pages on the wall, and periodically add the number of pages to keep a tally of the funds raised.

Activity 3: Spend or Save? Game

Materials Needed:

- one game piece for each player (a button, stone, cut-out coin or tiny toy)
- cut-out money (pennies, nickels, dimes, quarters and dollars)
- a "bank" to hold the money (a cup, box or envelope)
- a "savings account" to hold each player's money (a cup, box or envelope)
- paper and a pencil for each player to list how his or her money is spent
- one real penny

Introduction:

This game was designed to help students understand the rewards of saving. As players move their game pieces around the game board, they have opportunities to receive or earn money and spend or save it. The more money players save during the game, the more money they will have at the end of the game.

The game is not designed to have a winner. Rather, students are asked to take note of what they have earned while playing. Guide their discussions, but let them determine what important lessons they have learned.

Directions:

- Game pieces are placed on START.
- The first player flips the penny to find out how many spaces to move.*
  *Heads means move one space; tails means move two spaces.
- A player can move in any direction but should not end up on the space where he or she started.
  - **EARN:** If a player lands on a space where money is **EARNED** or received as a gift, that amount is taken from the bank and put into the player's savings account.
  - **SPEND or SAVE?:** If a player lands on a **SPEND or SAVE?** space, either option can be chosen.
  - **SPEND:** If **SPEND** is chosen, the player's savings account must have enough money to cover the cost of the purchase. The money is taken out of the savings account and put in the bank. The player writes or draws on his or her list what was purchased with the money.
  - **SAVE:** If **SAVE** is chosen, the player's turn simply ends.
- Players take turns flipping the coin and moving the game pieces around the board.
- The game is over when all players have reached the last space marked DOUBLE YOUR MONEY!
- When players land on DOUBLE YOUR MONEY!, they should count the money in their savings account, take an equal amount out of the bank and add it to their savings account.
- Players should look at what they have at the end of the game, including how much money is in their savings account and what they bought with their money.
- Play the game again. This time, have students decide what they would like to have at the end of the game and urge them to try to achieve their goals as they play.

INVOICE

Customer
Name ____________________
Address ____________________
City ____________ State _____ ZIP ________
Phone ____________________

Date ____________
____
____
____

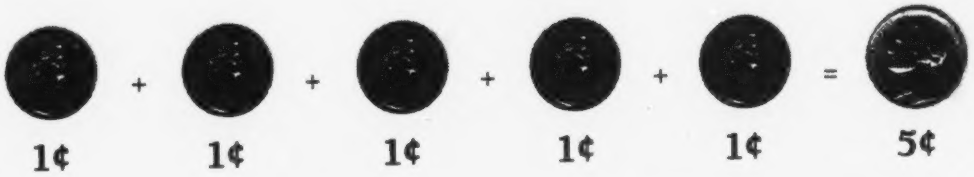
Quantity	Description	Unit Price	TOTAL

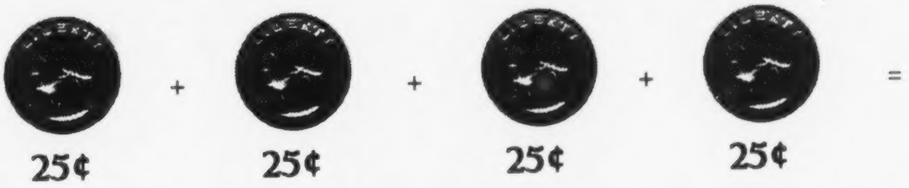
SubTotal	
Shipping & Handling	
Taxes	
TOTAL	

Payment Details
○ Cash
○ Check
○ Credit Card

Name ____________________
Credit Card # ____________________
Expires ____________

Money Equivalents

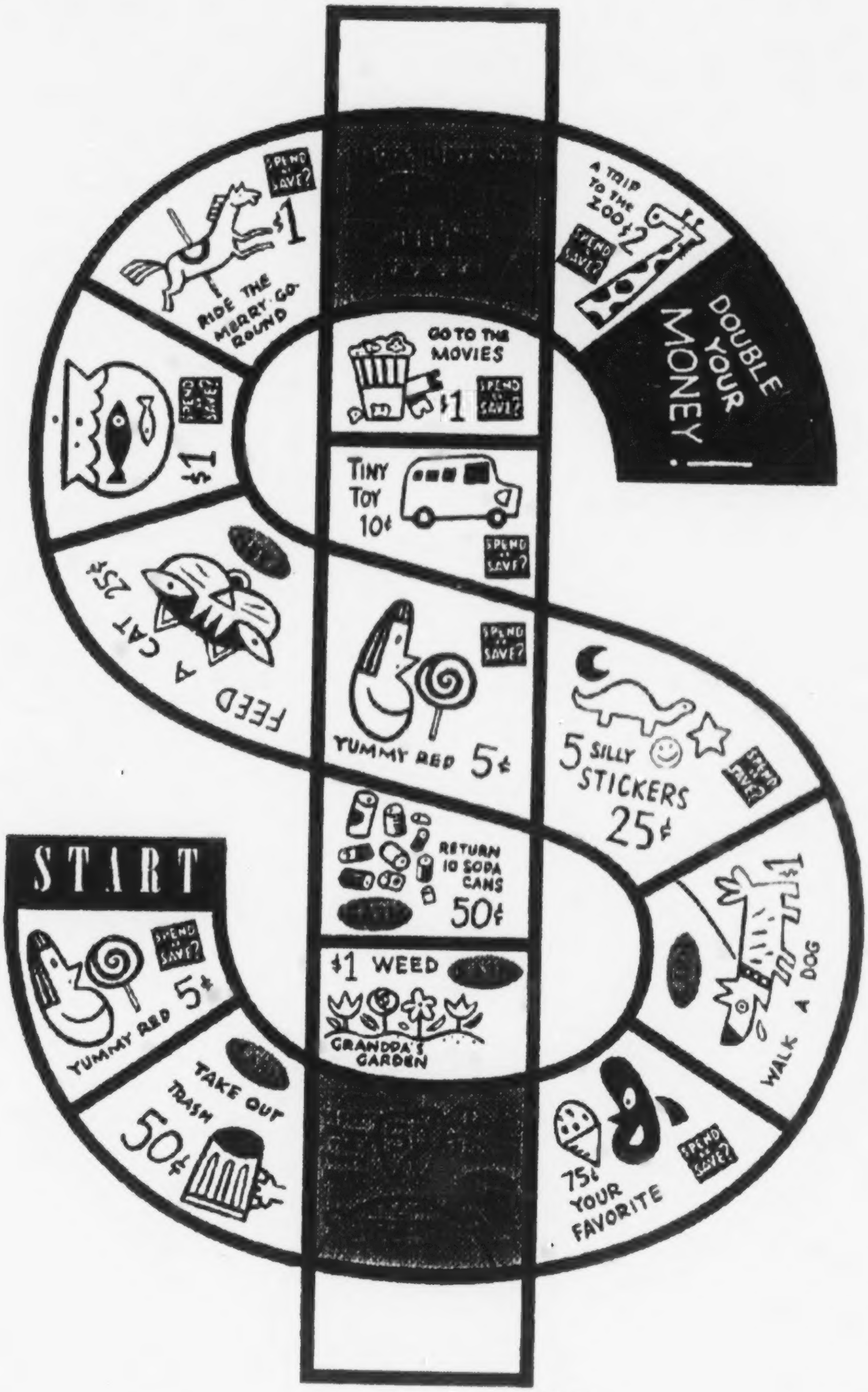




FEDERAL RESERVE NOTE
THE UNITED STATES OF AMERICA
B 34883987 Y
WASHINGTON, D.C.
ONE
ONE DOLLAR

$1

Spend or Save? Game


START
SPEND or SAVE?
YUMMY RED 5¢
TAKE OUT TRASH 50¢
$1 WEED
GRANDDA'S GARDEN
RETURN 10 SODA CANS 50¢
YUMMY RED 5¢
FEED A CAT 25¢
$1
RIDE THE MERRY-GO-ROUND $1
GO TO THE MOVIES $1
TINY TOY 10¢
A TRIP TO THE ZOO $2
DOUBLE YOUR MONEY!
5 SILLY STICKERS 25¢
WALK A DOG $1
75¢ YOUR FAVORITE

APPENDIX J:

Enrichment Ideas for Reading Books

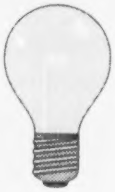
This appendix is useful in all lessons.

This appendix will help teachers create reading enrichment projects for students.

Introduction:

The best way for students to show that they have not only read but also understood a book is to complete a book project. Projects force students to think creatively about the book and all of the different ideas that the book contains. For book projects, students can work individually or in groups.

Evaluate book projects based on the following: how well the project shows the student or students have read and understood the book; how much work went into the project; how well the student or students performed or presented the project to the group; and whether the project shows creativity and ingenuity.



Project Ideas:

- Create a comic or picture book version of the book, drawing pictures to cover all the main events. Each picture or scene should include details found in the descriptions of how different people and places looked in the book.
- Write a new ending to the book. Start near the end of the book and write in the same style and voice as the author.
- Write about what the main character would experience if he or she attended your school. What would the character find different? the same?
- Imagine you are an extra character in the book. What would be different about your life? What would you like? dislike?
- Do a television news report on the book. Like a reporter, research the events of the story—interview different characters and cover the "main stories" of the book.
- Write a script to one of the chapters or parts of the book and perform a short play.
- Write and perform a trial of anyone in the story who did something illegal or wrong. Remember to argue both sides and consider how the legal system worked during the time the book was written.
- Create a research report on the different historical events that shaped the action in the book. Topics could include information on the country where the book was written or about the history of the time when the book took place.
- Create a movie preview, a poster, a song or other promotional projects for the "movie version" of the book. Who would play the different characters and why? Would any events in the book be changed for the movie version? Why?
- Compose a book of poems written by at least five different characters in the book. The poems should reflect the different personalities of each person.
- Interview at least thirty people. Ask them about situations in the book and how they would react if they were there.
- Interview three people who lived during the time the book was written. Compare and contrast their experiences to each other's and to the characters'. Relate their experiences to things that happened in the book.
- Create a board game on the book—playing the game would mean answering questions about the book.

APPENDIX K:

Chivalry KidZone Web Page Print-Out

This appendix accompanies the following lesson:

- If I Lived 1,000 Years Ago: The Middle Ages

This appendix will help teachers better illustrate life in the Middle Ages.

This appendix was adapted from:

- *The Knighthood, Tournaments & Chivalry Resource Library* by Brian R. Price (1998)

Further information can be gathered at:

- http://www.chronique.com

Medieval Nobles

In the Middle Ages, noblemen were the rulers. It was their duty to insure that the peasants and churchmen were defended so that they could live in peace and act as judges to handle disputes. The name comes from the belief that they were to act in a noble manner. Noblemen were themselves ranked from highest to lowest:

Title	What you called them	Their domain was called a...
King / Queen	*"Sire," "Grace," "Majesty"*	*Kingdom*
Prince / Princess	*"Your Highness"*	*Kingdom / Principality*
Duke / Duchess	*"Your Grace"*	*Duchy*
Earl or Count / Countess	*"Your Excellency"*	*County*
Baron / Baroness	*"Your Excellency"*	*Barony*
Knight	*"Sir"*	*Demesne*
Squire or Gentleman	—	—

"My Lord," was always acceptable for any rank above you

The King

The King was the most powerful nobleman in any kingdom. Kings were addressed as "Your Majesty" or "Sire" by people close to them. For ceremonies, he wore a crown to signify his importance. The king was "sovereign" in his realm, meaning that within his kingdom he could make the laws. Like other nobles, the king inherited his position from his father. Sometimes, when there was no son and a king died, there were bloody wars and struggles to see who would be the next king. Other times, the succession could become muddied for political reasons. The Wars of the Roses (in England, 1455 - 1487) raged on for years and were caused by this.

The Queen

The Queen ruled with the King, though in most cases she had much less power. Some queens, by strength of their own personality and family connections, were powerful noblewomen who outmaneuvered the men in their courts and reigned with vigor. Queen Eleanor of Aquitaine (1122-1204), who ruled in England with Henry II (1133-1189), was one such queen. Queen Elizabeth (1533-1603), daughter of Henry VIII (1491-1547), was another great queen who moved her kingdom into the Renaissance.

Princes & Princesses

Sons and daughters of the King and Queen were known as Princes and Princesses. The first son would be the Crown Prince, the one who would inherit the throne provided that he did not die before his father did. After him, the other sons would remain princes for their whole lives, becoming king only if their father was gone and all older brothers were also dead. Princesses were often married to princes of other kingdoms to secure alliances and good relations.

The King's Power

The King was responsible for the well-being of his kingdom and his subjects. He ruled through the other nobles, sometimes with more power and sometimes with less. Some kings were good for their kingdoms, bringing peace and prosperity, while others spent money unwisely and taxed their subjects harshly, bringing gloom and despair.

From the early Middle Ages (the reign of Charlemagne in the 8th century) through the reign of King Richard I (the Lionheart, 1157-1199), kings wielded their power freely and only the nobles could stand against them. Weak kings were faced with nobles who challenged their right to rule which made it hard for them to keep order, while strong kings could have more freedom and could do more for either good or ill. With the weak King John I (1167-1216) of England, however, the Barons of England sensed weakness and revolted, forcing him to give up power and to have the Barons and other Lords of England involved in the process of making laws. This famous document, the Magna Carta (Great Charter), was signed on June 15th, 1215, at a place in England called Runnymede. After the Magna Carta, a king could no longer have absolute power over his people. From this document, Europe gradually rediscovered the idea of Democracy, or government by the people, that we know today.

Other Nobles

Under the king were other nobles who ruled in the king's name over smaller portions of the kingdom. Like kings, nobles held their position and title from their father. Titles could also be won through marriage or occasionally by a grant from the king. Dukes and counts were the most powerful nobles, ruling over Duchies and Counties. Within each duchy or county, there could be smaller fiefs called Baronies, or sometimes a baron could hold their fief directly from the king. Knights held a smaller grant of land called a "demesne," a collection of farms, meadow and timberland that they held from the next highest noble or directly from the king.

Feudalism

Each noble held his land from the king, sometimes through other nobles, in a kind of contract or agreement called a feudal bond. This was called feudalism. There were two parts to the bond, fealty and homage. Under this contract, nobles pledged their allegiance as vassals to the king in exchange for the grant of land. In turn, the knights swore the same kind of fealty to the nobles, so that in the end the king was on top, the nobles owed him fealty, and the knights owed the nobles. Everyone was thus connected in a kind of bond.

The Feudal Ceremony

In a public ceremony, the nobles and knights, as vassals, swore homage to their liege lord. The ceremony was much the same all over Europe. Two men would face one another, the one agreeing to serve kneeling. They placed their hands together, palm to palm, and the liege closed his hands around them. He said simply something like the following:

> *"I become your man of the tenement I hold of you, and to you faithfully will bear body, chattels and earthly worship will support you against all folk saving the faith that I owe to our lord the king."*

The liege raised the kneeling man, and both kissed one another on the cheek to signal their agreement and friendship. This oath was a legal contract in which the liege promised to defend the vassal against all men. The vassal swore the same, adding reverence of the liege lord.

After the homage had been sworn, another rite was added, the Rite of Fealty. In the fealty ceremony the vassal pledged to uphold his duties:

> *"Hear this my lord: I will bear faith to you of life and member, goods, chattels and earthly worship so help me God and these holy Gospels of God."*

This was an oath, a kind of contract that could be brought up in court. Fealty was not mutual as homage was; but homage could not be brought up in court, while fealty could. This is why both were used.

The Duties of Nobles

Since nearly all nobles were knights, it was their duty to protect the peasants and the Church from enemies. Nobles were powerful military leaders who could command the "banners" of the many knights who lived on their lands, leading them into battle for the king, or in some cases, for their own purposes. In addition to military defense, which included the manning of castles, mounting patrols and accompanying the king to war for forty days per year, the nobles also had to defend their liege in a political sense, serving as judges in their own courts.

Peasants and freemen could bring their disputes to the lord's court just as we do now, and the court was bound to hear both sides of the complaint, then render a judgment that would bind and would not be overturned. Nobles were also bound to defend their liege against rumor and political plotting, although they often participated as often as they defended. In many times and kingdoms, powerful nobles were actually stronger than the king because the king did not have an army of his own—all his troops came from his nobles. Local "private" wars sometimes broke out between nobles, and there were, from time to time, groups of armed bandits that pillaged and marauded all over Europe. The noblemen were supposed to defend the people from these groups as well, but sometimes it was hard to tell who was an armed bandit and who was a knight. If the king was weak, he could do little to stop it.

To stop this petty warring, kings often diverted attention elsewhere. Edward I (1239-1337) of England sought to unify England, conquering Wales and Scotland. Edward III (1312-1377) chose both to fight in France and Scotland and to found the Order of the Garter, a knightly Order which was comprised of the most powerful nobles in England. Founded in 1347, the intent of the Garter was to improve the quality of Edward's knights and to bring them together into a group. The Garter proved extremely successful, and it was copied in France, Spain, the lowlands and Germany. It still exists today, but now the Garter Knights (KG) are the most powerful citizens in Britain and contributors to British culture.

As knights, nobles undertook activities to continually hone their skills and seek enjoyment. Noblemen spent their time hunting, tending to accounts, hearing court, advising their liege, inspecting their lands, training and accompanying their liege in war. Nobles spent much of their youth preparing for war in jousts and tournaments, through hearing tales of valor and generally learning to be a stronger knight. Many could read but those who could not would listen to tales of chivalry and courage done by knights of history and legend, hearing the tales spread by travelers to the Holy Land and all over Europe. These travelers were often welcomed in the household, since they brought news which was hard to get when their were no newspapers, telephones or electrical devices.

Noblewomen

Noblewomen had special duties: overseeing the nobleman's household, making sure that the children were properly trained, especially the daughters, and looking after the castle or estates when the lord was away. Sometimes they even defended the castle as commander when a house was caught under attack while the lord was away on Crusade or in service to the king. This did not happen often, but it is recorded in several places amongst the medieval chroniclers.

A noblewoman's life was not easy. While servants did keep the manor or castle maintained, there was much to do every day to insure that the household was topnotch. Noblewomen also had far less freedom to marry than we have today, their partners sometimes being chosen for political reasons when they were still children.

Women encouraged poetry and other literary arts. The vast body of stories and literature concerning King Arthur and the Knights of the Round Table were used by poets to try to improve the warrior-knights, and over time their ideals of chivalry came to be forged together with the knights' ways, and the ideas of the Church on knights into what we think of as Chivalry, or courtesy.

The Chivalric Ideal

Under the chivalric ideal, the lady was the source of the force that could strengthen a knight more powerfully than anything else except the knight's faith to God. Knights, such as Ulrich von Lichtenstein, did many deeds of valor for women, holding tournaments and performing deeds of great prowess in their honor. The lady was the earthly ideal of perfection, gentle and strong at the same time, beautiful and inspirational.

Children of Nobility

The children of nobles spent their time learning to be like their parents. From a young age, they were taken care of by their mother and any nurses she might be able to afford. The household servants helped to rear the children as well. Until boys were eight, they were usually under their mother's supervision, learning basic life on the estate. When boys were eight they would usually be sent away as pages, where they would learn the very basics of being a knight. When they were twelve or thirteen they would actually become squires, and would start training with weapons and horses. Girls continued under their mother's care until they were married, which could be any time from age twelve to age eighteen.

The Noble Household

The noble household was generally a busy place. Richer, more powerful nobles had more servants to keep track of their holdings and their houses. Some noble families would have many houses in different places, since a single nobleman might be Duke of one place and Baron of several others. He might also hold the charter for one or more free towns, which he would administrate. And then there were the forty days per year that each vassal pledged military service to their liege when they would probably be away and the affairs of the house would still need to be attended.

Although the nobles did enjoy horses, hawking and feasting, build large estates and participate in tournaments and in other leisure ways, they were also in charge of defending the land in the king's name. They had to do what they could to maintain justice, to defend against enemies both outside and inside the kingdom, possibly laying down their lives for the good of the kingdom.

What did a Crusader Wear?

During the First and Second Crusades, a man at arms would have been dressed head-to-toe in mail, linked iron rings woven together to provide defense against the cutting edge of a broadsword.

Medieval swords, it should be noted, were not necessarily sharp; the mass of the sword and the momentum of the horse and rider together made for a significant amount of force all concentrated behind the narrow edge of the sword. Medieval swords were generally more for crushing and breaking bones than they were for cutting.

Under his armor the knight wore "bries"—medieval underwear—padded garments called "chausses" (for the legs) and "aketon" or "gambeson" for the body. This aketon or gambeson was a quilted coat that was very thick, something like a heavy quilt or blanket.

Over this coat, the knight wore his mail "hauberk" or "haubergeon." It had sleeves that ran down to the elbow or wrist, depending upon the fashion of the time. The shirt was long until the 15th century, when mail as the main armor was finally replaced by iron and steel plates. The mail shirt was slipped over the head and wriggled into with ease. A hauberk weighed between twenty five and forty pounds, but when belted could be fought in easily and allowed for the very smooth movements needed for fighting from horseback.

Over the mail shirt, the knight would then wear a "surcoat" printed or embroidered with his arms, a colorful shield that identified him, his family and members of his lands who fought with him. The surcoat and the mantling on helmets was an important development during the 11th and 12th centuries because it was during this same time that the knight's iron cap was replaced with a fully-enclosed "pot" helmet, and identification of a man in full armor became difficult. Surcoats were worn both to keep the desert sun off of the metal armor and to provide a way to identify each man. Sometimes, when on crusade, knights took up a simple white surcoat bearing a cross to remind both themselves and the Saracens of their Holy mission.

Over the surcoat was placed the long knight's belt. Belted loosely around his waist, it helped to support the weight of the mail short on his hips so that it did not rest on his shoulders alone. Worn thus, the whole armor was relatively comfortable.

For his legs, the knight sometimes wrapped blankets around his knees to protect them from chafing. Over the cloth chausses he buckled on another set of mail defenses that covered his legs, also called chausses. Spurs were worn to insure that the horse would move when necessary, since the horse was the knight's most important weapon.

The head was protected first by a cloth cap and roll that both padded the iron helmet and kept the iron links out of the knight's hair. Next came the mail "camail," a sort of hood with an opening for the face that protected the vulnerable neck from sword cuts. Crusaders generally wore great helmets of iron that weighed from four to ten pounds with a narrow slot for the eyes called an "occularium." This metal defense for the head meant that it was very hard for others to cut through to his head or to wound him with arrows, but it also made breathing in the desert and communication between knights difficult.

Because of the sun and the need to identify each knight, "lambequin's" were added to keep the sun off of the helmet. These colorful cloths danced around as the knight rode.

A set of mail mittens on his hands, and the knight was ready for battle.

APPENDIX L:

Dinosaur Timeline

This appendix accompanies the following lesson:

- If I Lived 1,000,000 Years Ago: When Dinosaurs Ruled the Earth

This appendix will help teachers create a timeline with students of the evolution of human beings.

This appendix was adapted from:

- *The Columbus Dispatch Dynamite Dinosaur Site*

Further information can be gathered at:

- http://www.dispatch.com/dino/default.html

DINOSAUR TIMELINE: GEOLOGICAL TIME SCALE

PRE-CAMBRIAN ERA: ...the time before the first complex organisms appear.

PHANEROZOIC EON: ...the last 600 million years. Phanerozoic (meaning "visible life") is divided into three eras: Paleozoic, Mesozoic and Cenozoic.

PALEOZOIC ERA: ...600-225 million years ago, when shellfish insects plants, fish, spiders, amphibians and reptiles first appeared. The Paleozoic Era is divided into seven periods: Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian and Permian.

Cambrian Period: ...600-510 million years ago, when hard-bodied animals and plants first appeared.

Ordovician Period: ...510-440 million years ago, when the first vertebrates (jawless fishes) appeared and algae and insects colonized on land.

Silurian Period: ...440-408 million years ago, when life began to spread dramatically onto land.

Devonian Period: ...408-362 million years ago, when plants and seeds evolved rapidly on land. Vertebrate animals ventured from the water to the land at this time. Probably Ohio's most famous fossil, the giant carnivorous fish, Dunkleosteus, lived during the Devonian Period.

Mississippian Period: ...362-323 million years ago, when the coal age began.

Pennsylvanian Period: ...323-290 million years ago, when coal swamp forests thrived in North America and the first reptiles appeared.

Permian Period: ...290-248 million years ago, when the first archosaurs ("ruling reptiles") appeared. The Permian Period (and Paleozoic Era) ended with the largest mass extinction known.

MESOZOIC ERA: ...248-65 million years ago, when mammals, dinosaurs and birds appeared. Dinosaurs became extinct at the end of the Mesozoic Era. The Mesozoic Era is divided into three periods: Triassic, Jurassic and Cretaceous.

Triassic Period: ...248-213 million years ago, when the supercontinent Pangea began breaking into separate continents. The first true mammals and dinosaurs appeared near the middle of this period.

Jurassic Period: ... 213-143 million years ago, when many different dinosaurs appeared and ruled the earth. This is the period that the movie "Jurassic Park" was named after—about 143 million years later!—even though most of the dinosaurs in the movie lived during the Cretaceous Period.

Cretaceous Period:	...143-65 million years ago, when the first flowering plants appeared. The end of the period saw the extinction of the nonavian (nonbird) dinosaurs and many other forms of life.
CENOZOIC ERA:	...65 million to 5,000 years ago, when the first confirmed primates appeared and modern man is believed to have evolved. There are three periods within this era: Paleogene, Neogene and Quaternary.
Paleogene Period:	...65-23 million years ago, when the first true primates appeared and the Himalayan mountains were formed.
Neogene Period:	...23-1.65 million years ago, when our human ancestors appeared.
Quaternary Period:	...1.65 million to 5,000 years ago, when the first modern humans—people just like you—appeared and the first cities were built.

APPENDIX M:

SchoolHouse Rock Song Lyrics

This appendix accompanies the following lessons:

- Events that Changed the World: Discovering Electricity
- How to Change a Law
- Events that Changed the World: The American Revolution

This appendix will help teachers reinforce certain lessons with songs.

This appendix was adapted from:

- SchoolHouse Rock! Videos (a unit of ABC Videos)

Further information can be gathered at:

- http://genxtvland.simplenet.com/SchoolHouseRock/products/videos.hts

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Songs included in Appendix M:

- *No More Kings*
- *Fireworks*
- *The Shot Heard 'Round the World*
- *I'm Just a Bill*
- *Electricity, Electricity*

No More Kings

Rockin' and rollin', splishin' and a-splashin',
Over the horizon, what can it be?

The pilgrims sailed the sea
To find a place to call their own.
In their ship, Mayflower,
They hoped to find a better home.
They finally knocked
On Plymouth Rock
And someone said, "We're there."
It may not look like home
But at this point I don't care.

Oh, they were missing Mother England,
They swore their loyalty until the very end.
Anything you say, King,
It's OK, King,
You know it's kinda scary on your own.
Gonna build a new land
The way we planned.
Could you help us run it till it's grown?

They planted corn, you know
They built their houses one by one,
And bit by bit they worked
Until the colonies were done.
They looked around,
Yeah, up and down,
And someone said, "Hurray!"
If the king could only see us now
He would be proud of us today.

They knew that now they'd run their own land,
But George the Third still vowed
He'd rule them to the end.
Anything I say, do it my way now.
Anything I say, do it my way.
Don't you get to feeling independent
'Cause I'm gonna force you to obey.

He taxed their property,
He didn't give them any choice,
And back in England
He didn't give them any voice.
(That's called taxation without representation,
And it's not fair!)
But when the Colonies complained
The king said: "I don't care!"

He even has the nerve
To tax our cup of tea.
To put it kindly, King,
We really don't agree.

Gonna show you how we feel.
We're gonna dump this tea
And turn this harbor into
The biggest cup of tea in history!

They wanted no more Mother England.
They knew the time had come
For them to take command.
It's very clear you're being unfair, King,
No matter what you say, we won't obey.
Gonna hold a revolution now, King,
And we're gonna run it all our way
With no more kings ...

We're gonna elect a president! (No more kings)
He's gonna do what the people want! (No more kings)
We're gonna run things our way! (No more kings)
Nobody's gonna tell us what to do!

Rockin' and rollin', splishin' and a-splashin',
Over the horizon, what can it be?
Looks like it's going to be a free country.

Fireworks

Ooh, there's gonna be fireworks (fireworks!)
On the Fourth of July (red, white and blue!)
Red, white, and blue fireworks
Like diamonds in the sky (diamonds in the sky!)
We're gonna shoot the entire works
on fireworks
That really show, oh yeah,
We declared our liberty two hundred years ago.

Yeah!

In 1776 (fireworks!)
There were fireworks too (red, white, and blue!)
The original colonists,
You know their tempers blew (They really blew!)
Like Thomas Paine once wrote:
It's only common sense (only common sense)
That if a government won't give you your basic
rights
You better get another government.

And though some people tried to fight it,
Well, a committee was formed to write it:
Benjamin Franklin, Philip Livingston,
John Adams, Roger Sherman, Thomas Jefferson,
got it done, (Oh yes they did!)
The Declaration, uh-huh-huh,
The Declaration of independence (Oh yeah!)
In 1776 (Right on!)
The Continental Congress said that we were free
(We're free!)
Said we had the right of life and liberty,
... And the pursuit of happiness!

Ooh, when England heard the news (Kerpow!),
They blew their stack (They really blew their
cool!),
But the colonies lit the fuse,
There'd be no turning back (no turning back!).
They'd had enough of injustice now
But even if it really hurts, oh yeah,
If you don't give us our freedom now
You're gonna see some fireworks!

And on the Fourth of July they signed it
And fifty-six names underlined it,
And now to honor those first thirteen states,
We turn the sky into a birthday cake.
They got it done (Oh yes they did!)
The Declaration, uh-huh-huh,
The Declaration of independence (Oh yeah!)
in 1776 (Right on!)
The Continental Congress said that we were free
(We're free!)
Said we had the right of life and liberty,
... And the pursuit of happiness!

We hold these truths to be self evident,
That all men are created equal
And that they are endowed by their creator
With certain unalienable rights.
That among these are life, liberty, and the pursuit
of happiness,

And if there's one thing that makes me happy,
Then you know that it's (ooh!)
There's gonna be fireworks!

The Shot Heard 'Round the World

"The British are coming! The British are coming!"
Now, the ride of Paul Revere
Set the nation on its ear,
And the shot at Lexington heard 'round the world,

When the British fired in the early dawn
The War of Independence had begun,
The die was cast, the rebel flag unfurled.

And on to Concord marched the foe
To seize the arsenal there you know,
Waking folks and searching all around
Till our militia stopped them in their tracks,
At the old North Bridge we turned them back
And chased those redcoats back to Boston town.

And the shot heard 'round the world
Was the start of the Revolution.
The Minute Men were ready, on the move.
Take your powder, and take your gun.
Report to General Washington.
Hurry men, there's not an hour to lose!

Now, at famous Bunker Hill,
Even though we lost, it was quite a thrill,
The rebel Colonel Prescott proved he was wise;
Outnumbered and low on ammunition
As the British stormed his position
He said, "Hold your fire till you see the whites of their eyes!"

Though the next few years were rough,
General Washington's men proved they were tough,
Those hungry, ragged boys would not be beat.
One night they crossed the Delaware,
Surprised the Hessians in their lair,
And at Valley Forge they just bundled up their feet!

Now the shot heard 'round the world
Was the start of the Revolution.,
The Minute Men were ready, on the move.
Take your blanket, and take your son.
Report to General Washington.
We've got our rights and now it's time to prove.

Well, they showed such determination
That they won the admiration
Of countries across the sea like France and Spain,
Who loaned the colonies ships and guns
And put the British on the run
And the Continental Army on its feet again.

And though they lost some battles too,
The Americans swore they'd see it through,
Their raiding parties kept up, hit and run.
At Yorktown the British could not retreat,
Bottled up by Washington and the French Fleet,
Cornwallis surrendered and finally we had won!

From the shot heard 'round the world
To the end of the Revolution
The continental rabble took the day
And the father of our country
Beat the British there at Yorktown
And brought freedom to you and me and the USA!

God Bless America, Let Freedom Ring!

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I'm Just a Bill!

Boy: Whew! You sure gotta climb a lot of steps to get to this Capitol Building here in Washington. But I wonder who that sad little scrap of paper is?

I'm just a bill.
Yes, I'm only a bill.
And I'm sitting here on Capitol Hill.
Well, it's a long, long journey
To the capital city.
It's a long, long wait
While I'm sitting in committee,
But I know I'll be a law some day
At least I hope and pray that I will
But today I am still just a bill.

Boy: Gee, Bill, you certainly have a lot of patience and courage.

BILL: Well, I got this far. When I started I wasn't even a bill, I was just an idea. Some folks back home decided they wanted a law passed, so they called their local Congressman, and he said, "You're right, there oughta be a law." Then he sat down and wrote me out and introduced me to Congress. And I became a bill, and I'll remain a bill until they decide to make me a law.

I'm just a bill
Yes I'm only a bill,
And I got as far as Capitol Hill.
Well, now I'm stuck in committee
And I'll sit here and wait
While a few key Congressmen discuss and debate
Whether they should let me be a law.
How I hope and pray that they will,
But today I am still just a bill.

Boy: Listen to those Congressmen arguing! Is all that discussion and debate about you.

BILL: Yeah, I'm one of the lucky ones. Most bills never even get this far. I hope they decide to report on me favorably, otherwise I may die.

Boy: Die?

BILL: Yeah, die in committee. Ooh, but it looks like I'm gonna live! NOW I go to the House of Representatives, and they vote on me.

Boy: If they vote yes, what happens?

BILL: Then I go to the Senate and the whole thing starts all over again.

Boy: Oh no!

BILL: Oh yes!

I'm just a bill
Yes, I'm only a bill
And if they vote for me on Capitol Hill
Well, then I'm off to the White House
Where I'll wait in a line
With a lot of other bills
For the president to sign
And if he signs me, then I'll be a law.
HOW I hope and pray that he will,
But today I am still just a bill.

Boy: You mean even if the whole Congress says you should be a law, the president can still say no?

BILL: Yes, that's called a veto. If the president vetoes me, I have to go back to Congress and they vote on me again, and by that time you're so old...

Boy: By that time it's very unlikely that you'll become a law. It's not easy to become a law, is it?

BILL: No!

But how I hope and pray that I will.
But today I am still just a bill.

MAN: He signed you, Bill. Now you're a law!

BILL: Oh yes!!!

Electricity, Electricity

When you're in the dark and you want to see,
You need uh…Electricity, Electricity
Flip that switch and what do you get?
You get uh…Electricity, Electricity
Every room can now be lit
With just uh…Electricity, Electricity

Where do you think it all comes from
This powerful…Electricity, Electricity
Through high wires to here it comes,
They're bringing uh…Electricity, Electricity

Every building must be wired to use it,
Uh…Electricity, Electricity

Power plants most all use fire to make it,
Uh…Electricity, Electricity

Burnin' fuel and usin' steam,
They generate…Electricity, Electricity

Turn that generator by any means,
You're making uh…Electricity, Electricity

A generator is a machine that contains a powerful magnet
that creates a magnetic field. When wires are rotated rapidly
through this field then a current of electricity is produced.

Now, if we only had a superhero who could stand here and turn
the generator real fast, then we wouldn't need to burn so much
fuel to make…electricity.

Benjamin Franklin flying his kite
Was searching for…Electricity, Electricity.
He knew that it had somethin' to do with lightnin',
It's all uh…Electricity, Electricity.

Rubbin' a comb with wool or fur will give you a charge of
Electricity (static) Electricity

Strokin' a cat to make it purr, you're buildin' up static
Electricity, Electricity

Electricity at rest is called static electricity.
Like in the winter wearing a heavy coat,
You get a shock off the doorknob.
Or you scrape across a carpet
And sneak up on your very best friend,
And zap 'im on the ear with a shock of
Electricity, Electricity

Current flowing to and fro, makes a circuit of
Electricity, Electricity.
Voltage is the pressure that makes it go.
It's pushin' uh…Electricity, Electricity…

Watts will tell you just how much
You'll be usin'
Uh…Electricity, Electricity.

Powerful stuff, so watch that plug! It's potent
Electricity, Electricity.
Electricity, Electricity.

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